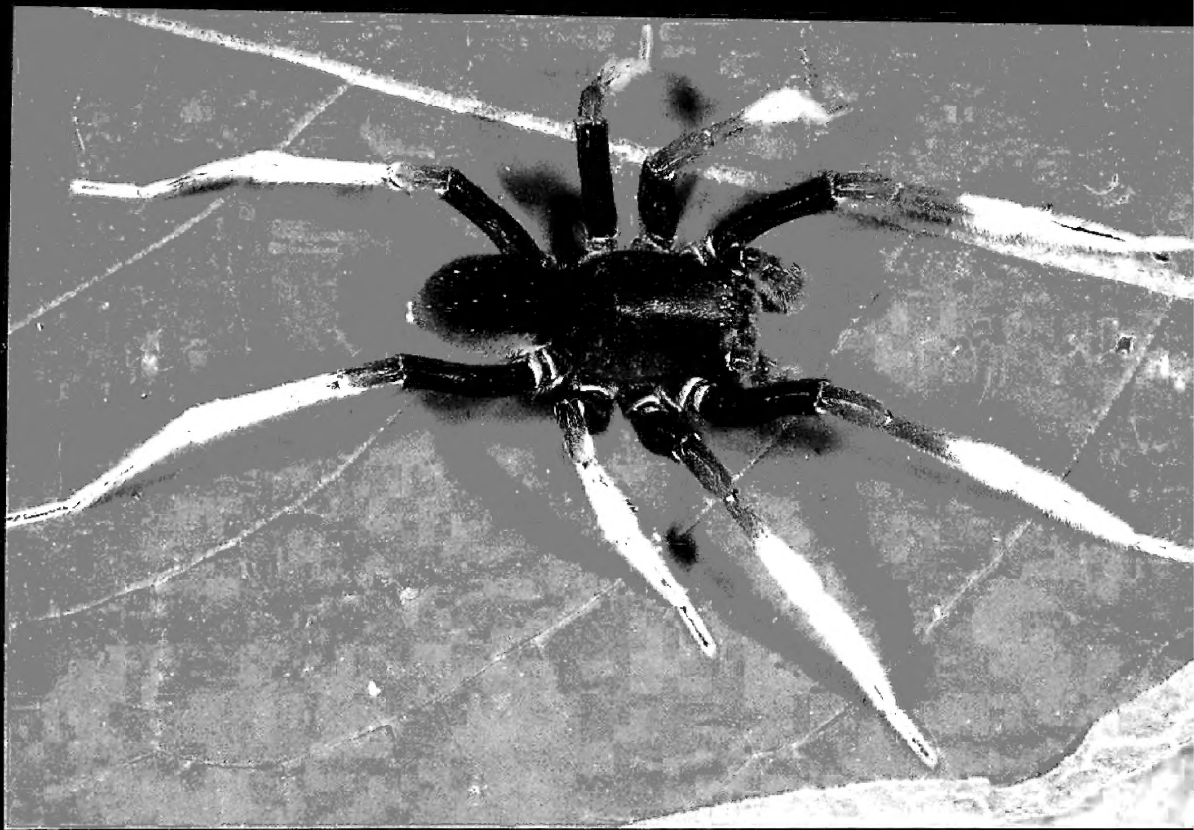


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## COVER IMAGE

FRONT COVER: Figure 1A. *Uduba kavanaughii*, holotype ♂ (CASENT9029870) from evergreen forest at 970m elevation at Talatakely, Parc National Ranomafana, January 2009.  
Photo by Nikolaj Scharff.

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# A Revision of the Malagasy Crack-Leg Spiders of the Genus *Uduba* Simon, 1880 (Araneae, Udubidae), with Description of 35 New Species from Madagascar

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The genus *Uduba* Simon 1880 (Araneae, Udubidae) is revised and diagnosed, and morphology is documented with light and scanning electron microscopy. *Uduba* may be diagnosed based upon a peculiar male palpal configuration comprising a flexibly attached embolus that passes around behind the tegulum, an apically bifurcated tegulum, and a sclerotized nodular process (UTA) at the ventral base of the palpal tibia, extending to the intersegmental membrane of the patella-tibia, and by a female vulva comprising an elongated spermathecal base (BS) making one or more spirals. Remarkably there are both cribellate and ecribellate *Uduba*, some that are otherwise morphologically similar enough to describe species pairs. A diagnostic key is provided to the 39 *Uduba* species known. The four previously known *Uduba* species are redescribed: the type species *Uduba madagascariensis* (Vinson, 1863) plus *U. dahli* Simon, 1903, *U. funerea* Simon 1906 and *U. evanescens* (Dahl, 1901). In addition the following 35 new species are described, all attributed to Griswold, Ubick, Ledford and Polotow: *U. andriamihajai* sp. nov., *U. balsama* sp. nov., *U. barbarae* sp. nov., *U. danielae* sp. nov., *U. fandroana* sp. nov., *U. fisheri* sp. nov., *U. goodmani* sp. nov., *U. hainteny* sp. nov., *U. halabe* sp. nov., *U. heliani* sp. nov., *U. hiragasy* sp. nov., *U. ibonia* sp. nov., *U. ida* sp. nov., *U. irwini* sp. nov., *U. jayjay* sp. nov., *U. kavanaugh* sp. nov., *U. lakroa* sp. nov., *U. lamba* sp. nov., *U. lavitra* sp. nov., *U. lehibekokoa* sp. nov., *U. milamina* sp. nov., *U. orona* sp. nov., *U. platnicki* sp. nov., *U. pseudoevanescens* sp. nov., *U. rajery* sp. nov., *U. rakotofrah* sp. nov., *U. rakotozafy* sp. nov., *U. rinha* sp. nov., *U. salegy* sp. nov., *U. sarotra* sp. nov., *U. schlingeri* sp. nov., *U. taralily* sp. nov., *U. valiha* sp. nov., *U. volana* sp. nov. and *U. woodae* sp. nov.

KEYWORDS. Africa, Indian Ocean, Lycosoidea, OC Clade, cribellum, colulus, new species.

The great island of Madagascar is known for its remarkable flora and fauna (see Goodman and Benstead 2003, Goodman 2022). Spiders are no exception to this remarkable record (Griswold 2003, Wood and Griswold 2022). Darwin’s Bark Spider spins the largest frame webs in the world, with their scaffolding stretching up to 25m across rivers (Kuntner and Agnarsson 2010). Inconspicuous but amazing are the Pelican Spiders (*Eriauchenius* and *Madagascarchaea*, Archaeidae), which like other members of the Assassin Spiders clade (Palpimanoidea) hunt and feed on other spiders (Wood and Scharff 2018, Wood *et al.* 2013). The huge, fast moving “foka” as many sparassids are called, have frightened many visitors, as have other nameless terrestrial runners (Griswold

2003). These latter, which are now known as Primitive Wolf Spiders (Wood and Griswold, 2022) or Malagasy Crack-Leg Spiders (Platnick 2020) and include spiders of the genus *Uduba* that may grow to large size, are the subject of this contribution.

In 1862 the French physician and naturalist Auguste Vinson was sent to Madagascar by Napoleon III to attend the coronation of Radama II. While visiting the island in his diplomatic guise he conducted valuable investigations of the islands' flora and fauna (Wikipedia 2021). At this time, while in Antananarivo, he first encountered these large, noticeable spiders where they were likened to the disturbingly large and fast giant crab spiders, "Foka", now classified in the Sparassidae. Vinson (1863) described the first *Uduba* known to science as a giant crab spider, *Olios madagascariensis* Vinson, 1863. [([https://en.wikipedia.org/wiki/Auguste\\_Vinson](https://en.wikipedia.org/wiki/Auguste_Vinson)], accessed 11 February 2021)]

The prolific French naturalist and father of Arachnology Eugene Simon studied these huge spiders nearly twenty years later and decided that the new genus *Uduba* was warranted (Simon 1880: 343) providing the new combination *Uduba madagascariensis* (Vinson, 1863). In the late 19<sup>th</sup> Century Simon moved this species back and forth between the genera *Uduba* and *Uliodon*, settling again on *Uduba* in 1906 (Simon 1906: 293) with the description of a female of this species. Meanwhile in Germany, Friedrich Dahl provided the name *Marussenca madagascariensis* for another giant spider from Madagascar (Dahl, 1901b: 248). Simon (1903: 975) recognized that Dahl's species belonged in his *Uduba*, which created a homonym, for which Simon provided the replacement name *Uduba dahli* Simon, 1903. Dahl (1901a) had specimens of another, smaller species from Madagascar, which he named *Calamistrula evanescens* and which he dissected and mounted on several slides for his study on the cribellum and calamistrum (Dahl, 1901a) (see also Figs. 37 A–D, 38 A–I). Pekka Lehtinen, in his monumental, comprehensive global study of spider phylogeny, transferred *Uduba* from Zoropsidae into his Miturgidae Uliodoninae (Lehtinen, 1967: 272).

Charles Griswold treated *Uduba* in a phylogenetic study of Lycosoidea and their kin (Griswold 1993), which recognized a large clade related to wolf spiders, i.e., Lycosoidea, that have a calamistrum that forms an oval patch of setae, later named the OC-clade ("Oval calamistrum" clade; Griswold et al. 2005: 75; Griswold and Ramirez 2017: 27, fig. 2,1; "OCC;" Azevedo et al., 2021: 3). Griswold et al. (1999: 59), in a detailed quantitative study of araneomorph spiders using a matrix of 137 characters scored for 43 exemplar taxa and analyzed under parsimony, moved *Uduba* from the Miturgidae to the Zorocratidae (=Zoropsidae). Six years later the morphological data were presented in detail (Griswold et al. 2005) using an enlarged matrix of 154 characters scored for 55 exemplar taxa and analyzed under parsimony, but in this study the Zorocratidae of Griswold et al., (1999) became paraphyletic, underscoring the continuing instability of Lycosoidea classification. Polotow, Carmichael and Griswold (2015) attempted a more comprehensive phylogeny using a "total evidence" approach, i.e., incorporating morphological and molecular data. In this study *Uduba*, *Raecius* from Africa, and four *Zorodictyna* species from Madagascar formed a well-supported clade, which was named the new family Udubidae Griswold and Polotow, 2015 (in Polotow, Carmichael and Griswold, 2015: 151). *Uduba* was removed from the Zorocratidae and placed in the Udubidae (Polotow, Carmichael and Griswold, 2015: 151) along with *Campostichomma*, *Raecius* and *Zorodictyna*. They also considered *Uduba* a senior synonym of *Calamistrula* Dahl, 1901 (type species *Calamistrula evanescens* Dahl, 1901), which until then had been placed in another family, Tengellidae, which underscored the confusion inherent in Lycosoidea spider classification. The Udubidae of Polotow, Carmichael and Griswold (2015; fig. 3) was sister to the Lycosoidea plus a newly circumscribed, enlarged Zoropsidae, the latter including several family-level taxa: Uliodoninae, Griswoldiinae, Zorocratidae, Tengellidae and Zoropsidae.



Wheeler *et al.* (2017) included these same molecular data in a much larger molecular dataset. This matrix comprised 932 spider species, representing 115 families (only the family Synsphyridae was not represented), 700 known genera, and additional representatives of 26 unidentified or undescribed genera. Eleven genera of the orders Amblypygi, Palpigradi, Schizomida and Uropygi were included as outgroups. The dataset included six markers from the mitochondrial (12S, 16S, COI) and nuclear (histone H3, 18S, 28S) genomes, and was analyzed by multiple methods, including constrained analyses using a highly supported backbone tree from transcriptomic data. The results continued to support a family Udubidae but failed to recover a monophyletic Zoropsidae (Wheeler *et al.* 2017: 13, fig. 6). Wheeler *et al.* (2017) continued to accept the results of Polotow, Carmichael and Griswold (2015), reasoning that this result was based on an abundance of evidence; this classification was accepted by Griswold and Ramírez (2017) and we concur in using the monophyletic Udubidae of Polotow, Carmichael and Griswold (2015). Whereas the classification of the OC Clade remains instable, the scope and definition of Udubidae has remained solid, and we use this family in the current contribution.

Madagascar has a spider fauna of nearly 800 known species (Wood and Griswold, 2022), a figure that is certain to increase dramatically. Critical to our expanding knowledge of the Madagascar spider fauna has been a series of biodiversity surveys organized by the California Academy of Sciences (CAS). Beginning in the late 1990s and continuing to just a few years ago, CAS, with generous support from the USA National Science Foundation (NSF) and the Schlinger Foundation, and in partnership with Parc Botanique et Zoologique de Tsimbazaza (PBZT) and Malagasy Institut pour la Conservation des Ecosystèmes Tropicaux (MICET), undertook an island-wide survey of arthropods producing numerous scientific specimens. The final count is yet untallied, but as of 2010 more than 800,000 arthropod specimens had been collected, databased, and processed (Fisher 2005). Further, these specimens were fast-tracked into the hands of scientists all over the world, creating an unprecedented resource for understanding Madagascar arthropods. By the end of 2010, 163 scientists had received 616 loans comprising 796,285 arthropod specimens. Coupled with this we have attained numerous new observations on and images of Madagascar spiders and their biology. The Madagascar fauna, as well as that of surrounding landmasses (e.g., Africa, south Asia), has been much better surveyed since 1990, with numerous taxonomic papers published in the last few decades (World Spider Catalog 2022). With this contribution we begin to reveal the rich fauna of Udubidae in Madagascar, describing 35 new *Uduba* species out of a total of 39.

## MATERIALS AND METHODS

Measurements (in millimeters) were taken using a reticule in Olympus SZH, Leica MZ12.5 or Leica MZ16 stereomicroscopes; carapace length and width were taken in dorsal view, carapace height (from lower margin to dorsal midline) was taken in lateral view; leg articles were measured in lateral view along the dorsal margin. Leg measurements are depicted in species descriptions as “(Femur + Patella + Tibia + Metatarsus + Tarsus = [Total])”, e.g., “II: 1.30 + 0.60 + 1.00 + 1.00 + 0.60 = [4.50].” Macrosetae are reported for the dorsal (d), prolateral (p), retrolateral (r), and ventral (v) surfaces of the legs and are listed from proximal to distal ends of each segment, as in Griswold (1987: 7, fig. 4).

Measurements are given based on one specimen of each sex, where available: this specimen is listed at the beginning of the description. Variation for each sex is reported separately.

A few specimens were reared to adulthood in the laboratory. These were typically kept in glass vials (29 X 80 mm) with damp cotton at one end, or in 18 x 9 x 5 cm plastic boxes. Spiders were fed live flies (*Drosophila melanogaster* Meigen 1830, or *Musca domestica* Linnaeus 1758, meal-

worm larvae (*Tenebrio molitor* Linnaeus 1758), and a variety of wild caught live insects. Most rearings failed.

**Details of terminology for genitalia.** Our species hypotheses, diagnoses, dichotomous key and discussion depend heavily on details of the male and female genitalia. Where some genitalic features are widely known among arachnologists, we also create many new terms here to describe and recognize species. The embolus (E) is universal on the palpal tarsus of male spiders and features like the median apophysis (MA) and conductor (C) are widely recognized in the RTA clade. The median lobe (ML) and lateral lobes (LL) of the epigynum are also generally homologized across the RTA clade. The female internal genitalia, the vulva, exhibit many homologies across the RTA clade, though terminology is less standardized. Our definitions and terminology owe much to the works of Sierwald (1990) and Griswold (1993). Nevertheless, the number and variety of essential terms that we use may prove confusing, so we have labeled several model figures to provide clarification. We invite the readers to reference several figures that we have labeled in detail as a guide to using our terminology. Figure 27 presents two views of an expanded palp of *U. halabe* on which we have labeled the structures. Figure 29 presents comparable views of male palps of our species groups with homologous features, e.g., TA1, MA and C color-coded. Male palp drawings of *U. fandroana* (Fig. 39), *U. ibonia* (Fig. 45), *U. madagascariensis* (Fig. 51), *U. pseudoevanescens* (Fig. 54), *U. rajery* (Fig. 55) and *U. rakotofrah* (Fig. 57) are thoroughly labeled, and Figure 28 shows details of the tegular apophyses of members of the **Epigynal Atrium** and *Uduba valiha* groups. We supplement these with labeled scanning electron micrographs of the male palp of *U. balsama* (Fig. 32), *U. evanescens* (Fig. 36), *U. fisheri* (Fig. 41), *U. madagascariensis* (Fig. 52) and *U. rajery* (Fig. 56). Details of the female genitalia may be found in Figure 68 (drawings of *U. madagascariensis*) and the drawings of Figures 76 and 77, on the photographs of Figures 80 and 81 and on the scanning electron micrographs of Figure 84 (*U. schlingeri*). We hope that these illustrations will make our discussions clear to all readers. Abbreviations are listed and defined below.

**Abbreviations (all).** AC, aciniform gland spigot; AER, anterior eye row; ALE, anterior lateral eyes; ALS, anterior lateral spinnerets; AME, anterior median eyes; An, anneli of subtegulum; At, atrium of epigynum; AtSp, atrial side plate of epigynum, e.g., in atrium lateral of median lobe; Av, alveolus of palpal tarsus; BH, basal haematodocha; BL, booklungs; BS, base of spermatheca of vulva; C, conductor; Ca, calamistrum; CD, copulatory ducts of vulva; Cl, colulus; Cm, cymbium; CmS, cymbial scopula; CO, copulatory openings of epigynum; Cr, cribellum; CY, cylindrical gland spigot; d, dorsal; E, embolus; Eb, embolic base; EF, epigastric furrow of abdomen; F, fundus of reservoir of spermduct between tegulum and subtegulum; f, femur; FD, fertilization duct of vulva; Fls, flanking spigots of pseudoflagelliform gland spigot; HS, head of spermatheca of vulva; ITC, inferior tarsal claw (third claw, single); LL, lateral lobe of epigynum; LP, lateral process of epigynum; MA, median apophysis; MAP, major ampullate gland spigot; mAP, minor ampullate gland spigot; ML, median lobe of epigynum; Ms, modified spigot; mt, metatarsus; Nu, nubbin of a spigot; OA, ocular area; OAL, ocular area length; OQA, ocular quadrangle anterior width; OQP, ocular quadrangle posterior width; p, prolateral; PER, posterior eye row; PI, piriform gland spigot; PLE, posterior lateral eyes; PLS, posterior lateral spinnerets; PME, posterior median eyes; PMS, posterior median spinnerets; PP, pars pendula of embolus; PsFl, pseudoflagelliform gland spigot; Pt, petiole of subtegulum; pt, patella; r, retrolateral; RTA, retrolateral tibial apophysis on male palp, typically arising apically; S, spermathecae of vulva; Sp, reservoir of spermduct in tegulum; ST, subtegulum; STC, superior tarsal claws (paired); T, tegulum; t, tarsus; TA1, proapical apophysis of the tegulum; TA2, proapical apophysis of the tegulum, arising just prolaterad of distal notch; TA3, retroapical apophysis of the tegulum, typically with apex extend-

ing in prolateral direction; **Ti**, tibia; **TP**, tartipore; **UTA**, basal tibial apophysis on male palp, which is located at proximoventral margin of tibia extending above patellar intersegmental membrane; **v**, ventral; **VTA**, ventral tibial apophysis on male palp, typically arising at midsegment.

**Male genitalia.** **An**, anneli of subtegulum; **Av**, alveolus of palpal tarsus; **BH**, basal haematodocha; **C**, conductor; **Cm**, cymbium; **CmS**, cymbial scopula; **E**, embolus; **Eb**, embolic base; **F**, fundus of reservoir of spermduct between tegulum and subtegulum; **MA**, median apophysis; **PP**, pars pendula of embolus; **Pt**, petiole of subtegulum; **r**, retrolateral; **RTA**, retrolateral tibial apophysis on male palp, typically arising apically; **Sp**, reservoir of spermduct in tegulum; **ST**, subtegulum; **T**, tegulum; **TA1**, proapical apophysis of the tegulum; **TA2**, proapical apophysis of the tegulum, arising just prolaterad of distal notch; **TA3**, retroapical apophysis of the tegulum, typically with apex extending in prolateral direction; **UTA**, basal tibial apophysis on male palp, which is located at proximoventral margin of tibia extending above patellar intersegmental membrane; **VTA**, ventral tibial apophysis on male palp, typically arising at midsegment.

**Female genitalia.** **At**, atrium of epigynum; **AtSp**, atrial side plate of epigynum, e.g., in atrium lateral of median lobe; **BS**, base of spermatheca of vulva; **CD**, copulatory ducts of vulva; **CO**, copulatory openings of epigynum; **EF**, epigastric furrow of abdomen; **FD**, fertilization duct of vulva; **HS**, head of spermatheca of vulva, including spermathecal poreplate; **LL**, lateral lobe of epigynum; **LP**, lateral process of epigynum; **ML**, median lobe of epigynum; **S**, spermathecae of vulva.

**Somatic morphology.** **AER**, anterior eye row; **ALE**, anterior lateral eyes; **AME**, anterior median eyes; **BL**, booklungs; **Ca**, calamistrum; **CD**, copulatory ducts of vulva; **Cl**, colulus; **Cr**, cribellum; **d**, dorsal; **EF**, epigastric furrow of abdomen; **d**, dorsal; **f**, femur; **ITC**, inferior tarsal claw (third claw, single); **mt**, metatarsus; **OA**, ocular area; **OAL**, ocular area length; **OQA**, ocular quadrangle, anterior; **OQP**, ocular quadrangle, **p**, prolateral; posterior; **PER**, posterior eye row; **PLE**, posterior lateral eyes; **PME**, posterior median eyes; **pt**, patella; **r**, retrolateral; **STC**, superior tarsal claws (paired); **t**, tarsus; **Ti**, tibia; **v**, ventral.

**Spinning organs.** **AC**, aciniform gland spigot; **ALS**, anterior lateral spinnerets; **Cl**, colulus; **CR**, cribellum; **CY**, cylindrical gland spigot; **Fls**, flanking spigots of pseudoflagelliform gland spigot; **MAP**, major ampullate gland spigot; **mAP**, minor ampullate gland spigot; **Ms**, modified spigot; **Nu**, nubbin of a spigot; **PI**, piriform gland spigot; **PLS**, posterior lateral spinnerets; **PMS**, posterior median spinnerets; **PsFl**, pseudoflagelliform gland spigot; **TP**, tartipore.

**Institutions.** **AMNH**, American Museum of Natural History, New York; **ANGAP**, Association Nationale pour le Gestion des Aires Protégées, Antananarivo; **BMNH**, The Natural History Museum, London; **CAS**, California Academy of Sciences, San Francisco; **FMNH**, Field Museum of Natural History, Chicago; **MBSA**, Museum of Biology Systematics of Arthropods, University of New Mexico, Albuquerque; **MCZ**, Museum of Comparative Zoology, Harvard, Cambridge; **MICET**, Madagascar Institut pour la Conservation des Ecosystèmes Tropicaux; **MNHN**, Muséum National d'Histoire Naturelle, Paris; **MRAC**, Royal Museum for Central Africa, Tervuren; **NSF**, USA National Science Foundation; **PBZT**, Collection of Entomology at the Parc Botanique et Zoologique de Tsimbazaza, Antananarivo; **USNM**, Smithsonian Institution, Washington DC; **ZMB**, Museum für Naturkunde, Berlin, Dahl collection; **ZMUC**, Zoological Museum, University of Copenhagen.

References to figures in this paper are listed with an initial capital (Fig.); references to figures published elsewhere are listed in lower-case type (fig.).

As suggested by Agnarsson and Kuntner (2007), we consider it important to cite original descriptions in the references: the convention of not citing such original works undervalues the primary literature of taxonomy.

All new species are authored by Griswold, Ubick, Ledford and Polotow [GULP].

**Material Examined.** The sections on material examined report type and other specimens. Records are arranged by localities, specimens for each locality are summed for depository, and specimen database numbers are listed thereafter by depository. The specimen numbers assigned, e.g., CASENT..., represent identifiers for this specimen level database and should not be taken to imply institutional ownership of specimens. For example, a paratype male of *Uduba pseudovanescens*, new species, which was collected at 57 km Route d'Anosibe de Moramanga, September 1953 by J. Millot and that is deposited in MNHN Paris, is also assigned the specimen number CASENT9006006 for this revision.

**Morphology documentation.** Morphological observations and illustrations were made using a Leica MZ12 or Leica MZ16 stereomicroscope with a camera lucida. Digital scanning electron micrographs (SEM) were taken on a Hitachi S-520, Leo 1450VP or Hitachi SU3500S SEM at the Department of Entomology at the California Academy of Sciences. Specimens were critical point dried, sputter coated with gold-palladium, and mounted on copper wire with white glue. A limited number of specimens were available for SEM analysis; therefore, descriptions of features based solely on electron microscopy (e.g., spinneret spigot morphology) may understate variation. Specimen preparation follows Álvarez-Padilla and Hormiga (2008), except as indicated below. Vulvae were cleaned by immersion in a trypsin solution for three to five days at room temperature or by digestion with contact lens cleaner overnight (Sierwald 1990) or cleared with clove oil or with Chlorox® bleach. Male palpi were expanded by immersing them overnight in a 10–15% solution of potassium hydroxide (KOH); palpi were transferred back and forth between KOH and distilled water until expansion stopped. Expansion could be rapidly accomplished by boiling them in dilute lactic acid for a few minutes in a double boiler, and transferring them to distilled water where expansion continued (Ledford *et al.* 2011). All measurements are in millimeters.

Photographs of somatic morphology and female genitalia were taken with a Nikon DXM 1200 digital camera mounted on a Leica MZ16A stereomicroscope. Multiple images were combined with software from Syncroscopy® and also the Helicon Focus®. Additional stacked images were taken by Vic Smith using the Visionary Digital Imaging System “Big Kahuna” at the Department of Entomology at the CAS (Smith 2009). Photographs of the epigynum in dorsal view were taken with the specimen cleared in lactic acid. Illustrations of male genitalia were sketched using a camera lucida mounted on a Leica MZ12.5 stereomicroscope, rendered on coquille board, scanned and finished in Adobe Illustrator® (version CS3). Illustrations are by Jenny Speckels (JS), Giovanni Maki (GM), Rachel Diaz-Bastin (RDB), Daniele Polotow (DP) and Charles Griswold (CG).

**Species concept.** Species are recognized when we found it possible to list morphological characters that consistently distinguished entities. When it is possible to express species differences in a dichotomous key, we have used these criteria to propose species hypotheses, i.e., to recognize and diagnose species. We have used cribellar form as species diagnostic, i.e., when two populations are alike in every character except the possession of a cribellum or colulus, or when two populations that have a cribellum that is entire or divided, we have proposed these as different hypothetical species. Males and females of the same cribellar morphology have been associated when collected at the same locality, and ideally in the same set of collection events. We have some aid to associate species based on consistent patterns of male and female genitalia, e.g., males with a large, screw-shaped TA3 are generally associated with females that have an epigynum with a central atrium and median lobe. We do have situations in which males and females have been collected without association of the other sex: in these cases, we have described the unassociated males (e.g., the ecribellate male *Uduba fandroana*), as one new species and unassociated females (e.g., *Uduba barbarae*) as another new species. We recognize that we run the risk of inflating the number of species by separately describing unaccompanied males or females, but in most cases to associate



these would be guesswork. We anticipate a time when DNA data will help to associate or further distinguish unaccompanied males or females but we lack those data at this time. We also recognize that we may overlook population variation or ontological changes by separating cribellate and ecribellate pairs as distinct species. Such pairs are almost always in allopatry, but we do have one case of sympatry in species that differ only in being cribellate or ecribellate. Whether the cribellate or ecribellate forms remain distinct or represent a species polymorphism deserves further study, again preferably with DNA data. We are confident that we have proposed consistent working hypotheses for species boundaries, but the questions of potential polymorphism, interbreeding and also of species phylogeny will be addressed in the future with more data.

**Maps.** Google Earth was used to locate or estimate localities, and these are compared with the label data on latitude-longitude and elevation. The maps were made using DIVA-GIS, version 7.4.0.1, available at <<http://www.diva-gis.org/>>. Shapefile data available from <<http://www.natureearthdata.com/downloads/10m-gray-earth/gray-earth-with-shaded-relief-ocean-bottom-anddrainages/>>.

The plates were prepared using Adobe Photoshop and the background vegetation map of Madagascar is from Du Puy and Moat (2003) and was obtained online from the GIS Unit of the Royal Botanic Gardens, Kew, and used with permission.

### BEHAVIOR AND NATURAL HISTORY

Our study is based upon 573 adult specimens of preserved *Uduba*, 129 females and 444 males, yet we have little knowledge of living *Uduba*. We have only a few recorded observations and have seen only a few *Uduba* alive in their habitat. We have seen *Uduba* wander on the ground at night, and we have found them sheltering beneath objects such as rotting logs or occupying holes or burrows (Figs. 2 A–D): these data suggest that *Uduba* are ground-dwelling spiders. *Uduba* spiders have no obvious digging organs comparable to the cheliceral rastellum of many mygalomorphs, which suggests that if they do excavate burrows they must do so with their large, powerful chelicerae and their legs. For most of our *Uduba* specimens we have no biological information except the place and means of collection. The vast majority of *Uduba* specimens were collected passively in pitfall traps or in aerial malaise traps. Most of the latter traps were in contact with the ground but there are some specimens from “canopy traps.” This suggests that some spiders wander in trees far from the ground, e.g., females of *U. halabe* and *U. milamina* and males of *U. fandroana* and *U. evanescens* (Dahl, 1901), all of which were taken at various times in a canopy trap in open area at forest edge at the Ranomafana Radio Tower in Fianarantsoa Province.

We have no data on seasonality in *Uduba*, and no evidence that they are seasonal. The majority of expeditions were carried out by the Fisher-Griswold Arthropod Team during the rainy season, between October and March. *Uduba* species were abundant at Ranomafana in April, and many were collected by Vince and Barbara Roth in northern Madagascar (Nosy Be) and by Brian Fisher in central Madagascar (Tsinjoarivo), at each locality during August. Our data reflect the opportunity for collection and at no site do we have the year-round collecting data sufficient to suggest the phenology or even life cycle of any *Uduba* species.

A remarkable feature of the “Malagasy crack-leg spiders” is the presence of an autospasy suture through the bottom of the leg tibiae of males: this suture is just distad of the basal pair of ventral spines (Figs. 12C, 13D; Griswold *et al.*, 2005: 50). Such cracks are not unique to *Uduba*: many male Udubidae and Zoropsidae have such cracks, and their distribution is very homoplasious. The zoropsid genus *Zoropsis* has the crack, but the related genus *Takeoa* lacks it (Griswold 1993: 5). Function of the crack also differs among spiders: in *Zoropsis spinimana* the crack holds firm,



whereas the legs break readily in *Uduba madagascariensis* (Griswold *et al.*, 2005: 50).

*Uduba* species show a remarkable array of spinning organs, some species being cribellate and some ecribellate. Whereas the former must retain some capacity to produce cribellate sticky silk the ecribellate species cannot. We have a few observations of cribellate *Uduba* that have woven a cone of cribellate silk extending above the mouth of a burrow, i.e., *Uduba schlingeri* from Ranomafana (Figs. 2 A, C). The cribellate species *Uduba pseudoevanescens* are also known to make silk-lined burrows. Several ecribellate species have females that have been observed in silk-lined burrows, e.g., *Uduba evanescens* (Dahl, 1901) at Ranomafana (Fig. 2D) and *Uduba volana* at Ambohimanga. *Uduba madagascariensis* (Vinson, 1863) from Ambohimanga not only make burrows but these are surmounted by short turrets of woven grass, mostly on steep banks. Ecribellate females of *Uduba barbarae* are large spiders: recorded specimens are 21.00–33.14 mm in total length. Barbara Roth has recorded these spiders inhabiting large, deep burrows in the Lokobe Forest on the island of Nosy Be: her notes state “3cm diameter hole x 16cm deep in trail, few leaves around entrance tied by few silken threads.”

### The Cribellate and Ecribellate Question

Until the late 20<sup>th</sup> century, the presence or absence of a cribellum was thought to mark a fundamental division of the True Spiders, or Araneomorphae. The German zoologist Philipp Bertkau was the first to use the cribellum as a key character in spiders and he created the terms “Cribellata” and Ecribellata” (Bertkau, 1882). Simon (1892: 61) made the Cribellata and Ecribellata primary subdivisions of his “Araneae verae.” The cribellate and ecribellate spiders were thought to represent two ancient lineages, which had converged evolutionarily to produce orb webs or whirlingig predation, in which spiders of the Hersiliidae and Oecobiidae whirl around and around their prey covering it with silk. Beginning in the 1960’s and 1970’s with the detailed comparison of cribellate and ecribellate spiders (Baum, 1972), the discovery of a largely unknown fauna (Forster and Wilton, 1973), a truly global perspective of the research by Lehtinen (1967) and the advent of cladistic reasoning (Platnick and Gertsch, 1976), evidence showed that cribellate and ecribellate families and even genera could be one-another’s closest relatives.

Species of *Uduba* that have essentially identical genital organs may differ in having or lacking a cribellum. The conclusion that closely related species may be cribellate or ecribellate is remarkable, though a similar pattern seems to prevail in the zoropsid genus, *Zorocrates* (Platnick and Ubick, 2007). The possibility of cribellate and ecribellate sister species is an avenue for future research in *Uduba*. Are the cribellate–ecribellate pairs such as *U. pseudoevanescens* and *U. evanescens* (Dahl, 1901), *U. ibonia* and *U. hainteny* or *U. halabe* and *U. platnicki* really distinct species? Could the condition cribellate or ecribellate be a result of phenological changes, e.g., as in apterous and alate aphids, or represent geographic variation? In the future, comparison of even simple DNA markers, e.g., the “DNA Barcode” (Astrin *et al.*, 2016), should be sufficient to say if cribellate and ecribellate pairs are sister species or representatives of variation within species. We lack DNA data in our current study and have decided that the most parsimonious conclusion is that, since we can diagnose cribellate and ecribellate pairs, we have recognized these as separate, named species, i.e., they fit the criteria of diagnosability. Future studies should test these hypotheses.

## TAXONOMY

Udubidae Griswold and Polotow, in Polotow, Carmichael and Griswold, 2015: 151

Type genus *Uduba* Simon, 1880: 343 (Type species by monotypy: *Olios madagascariensis* Vinson, 1863)

## In synonymy

*Calamistrula* Dahl, 1901a = *Uduba* Simon, 1880 (Polotow, Carmichael and Griswold, 2015: 151)

*Mnesitheus* Thorell, 1899 = *Raecius* Simon, 1892 (Lehtinen, 1967: 250)

## Types

*Uduba* Simon, 1880, type genus.

*Olios madagascariensis* Vinson, 1863: 100, 305; type species. = *Uduba madagascariensis* (Vinson, 1863)

**Diagnosis.** Udubidae are typical entelegyne RTA-clade spiders with three tarsal claws (Figs. 18 D–F), multiple rows of tarsal trichobothria of about equal length (Fig. 14 B, D), eight eyes in two nearly straight rows (Figs. 4 D, F, 12 A, D), indirect eyes with canoe-shaped tapetum (Fig. 12D), the cheliceral fang with interior serrula weak to absent (Figs. 15 A, C) and uniquely textured spermathecae (Figs. 82 B, E, 83 D, E). Udubidae are cribellate (Fig. 26 A), with an entire or divided cribellum, or ecribellate (Fig. 26 C), if cribellate they are typical members of the OC-clade in having an oval calamistrum (Figs. 13B, 14G) and have cribellar spigots grouped into clumps (Figs. 23 A, C). Males have a subbasal crack or line of autospasy on the leg tibiae (Figs. 12C, 13D).

**Composition.** *Campostichomma* Karsch, 1892, *Raecius* Simon, 1892, *Uduba* Simon, 1880 and *Zorodictyna* Strand, 1907. Griswold (2002) revised the African *Raecius*, adding three new species for a total of six in the genus. Polotow and Griswold (2017) revised the Sri Lanka *Campostichomma*, adding three new species to total five. *Zorodictyna* are endemic to Madagascar and currently the genus comprises only two described species, *Zorodictyna inhonesta* (Simon, 1906) and *Z. oswaldi* (Lenz, 1891), but at least thirty new species remain to be described; some of these have appeared as vouchers in DNA phylogeny studies. *Zorodictyna* exemplars in Wheeler *et al.* (2017: 586) included “*Zorodictyna* sp. CG45,” “*Zorodictyna* sp. CG47” and “*Zorodictyna* sp. CG300” and *Uduba* exemplars comprised “*Uduba* sp. CG8” and “*Uduba* sp. CG301.” The genus *Zorocrates* has been excluded by molecular phylogeny (Polotow *et al.*, 2015: 131, fig. 2; Wheeler *et al.*, 2017).

**Distribution.** Tropical and subtropical Africa, Madagascar, and Sri Lanka.

*Uduba* Simon, 1880

*Uduba* Simon, 1880 [urn:lsid:nmbe.ch:spidergen:01766] {from World Spider Catalog (2021). World Spider Catalog. Version 21.5. Natural History Museum Bern, online at <http://wsc.nmbe.ch>, accessed on {January 6, 2021}. doi: 10.24436/2. Transferred from the Zoropsidae to the Miturgidae by Lehtinen, 1967: 272, to the Zorocratidae (= Zoropsidae) by Griswold *et al.*, 1999: 59, placed in Udubidae by Polotow, Carmichael and Griswold, 2015: 151, considered a senior synonym of *Calamistrula* Dahl, 1901a, type *Calamistrula evanescens* Dahl, 1901a [urn:lsid:nmbe.ch:spidergen:02088] by Polotow, Carmichael and Griswold, 2015: 151.

## Transferred to other genera

*Uduba inhonesta* Simon, 1906 = *Zorodictyna inhonesta* (Simon, 1906)

**Diagnosis.** *Uduba* present all the characters of the Udubidae but may be recognized by their

unique male genitalia and by the characteristic female genitalia. They are typical members of the RTA Clade (Coddington and Levi, 1991: 577, fig. 2; Griswold et al., 2005: 74) in having the male palpal tibia with a retroapical process (the RTA) as in other RTA-clade spiders but with a unique midventral, setose process (VTA) and unique basoventral, sclerotized knob (UTA) at junction of tibia and patella (Figs. 27 A, B, 36 A–C, 56 A). Palpal bulb with elongate, threadlike embolus arising from flexibly attached probasal bulbous embolic base and extending dorsally behind the subtegulum and tegulum to reappear from alveolus near alveolar apex (Figs. 32 B, C, E, F, 62 C, E, 65 C, F); bulb V-shaped with apicomedian notch, proapically an elongate, thick process (TA1) and a small process (TA2) of various forms at promedian margin of notch, retrolateral to notch a transverse process (TA3) of various forms, with stiff, hyaline conductor along its retroapical margin (Figs. 27 A, B, 29 A–I). Female genitalia with epigynal plate of various forms, convex and entire (Figs. 70 A, C, D) or with a median lobe surrounded by a depressed atrium (Figs. 74 A, C, 84 A); vulva with sinuous spermathecae, typically forming at least one to as many as four spiral loops (Figs. 84 B, C); pores of HS difficult to locate (Figs. 68 B, D, 83 B–E, 84 B), in many species hidden, but the spermathecal texture is typical of udubid spiders in having many fine pores throughout (Figs. 82 B, 83 D). *Uduba* differ from *Campostichomma* in that *Campostichomma* are all ecribellate and small, lack the UTA but have a strong lateral groove on cymbium (Griswold 1993: 16, figs. 31, 33, 34; Polotow and Griswold, 2017: 59, figs. 4 A–C); differ from *Raecius* in that the latter has a T/ST lock typical of the OC clade (Griswold 1993: 14, figs. 25–27; Griswold et al., 2005: 137, figs. 22, 23); differ from *Zorodictyna* in that the latter has a T/ST lock typical of the OC clade and a cymbium with retrobasal projection (Griswold 1993: 13, figs. 19–21).

**Note on the name *Uduba*.** The name *Uduba* is mysterious. The late Professor H. Don Cameron, formerly a Classics scholar at the University of Michigan and a student of the history of scientific names of spiders, kindly researched the origin of the name *Uduba*. Simon (1880: 343) states in his introduction of the name *Uduba* that it is a “Nom géographique.” But it is apparent that no Malagasy word ever begins with the letter U. Professor Cameron’s research is so interesting, and so indicative of the scholarship necessary to identify the sources of many scientific names, that it is worth quoting his correspondence from August 1997 in detail.

Cameron (in lit.) states that “*Diligence and ingenuity have triumphed. I can now tell you what Uduba means! ... After failing to find the name in the Times Atlas, and after enlisting the aid of the University [of Michigan] map library, with every name in the world on a computer to no avail, I [H. Don Cameron] got a bright idea. Triumph. Uduba is the name of a river in Spain (Hispania Tarraconensis) mentioned by Pliny the Elder in his Natural History (Pliny, 3.3.20). The other trick is that [Uduba] it is a textual variant read in the 19<sup>th</sup> century editions of Pliny, and modern editions read Udiva. So it has nothing to do with Madagascar or anything at all. It is arbitrary. Simon regularly did this kind of thing. Rather than struggle to make up a suitable name from Latin or Greek, he [Eugene Simon] would search the handbooks of mythology or the index to Pliny to find a name he could use.*” Cameron also suggested “*I have another guess. Simon says {ha, ha, he, he, Simon Says!} that the genus Uduba is close to Uliodon...I’ll bet Simon wanted a new genus name which would reflect the closeness to Uliodon and looked in the U section of the Pliny index for something close.*”

According to Cameron’s research, *Uduba* is a name that Simon found in the index of a 19<sup>th</sup> century edition of Pliny the Elder’s Natural History. It was very common for Simon and other authors, especially of the 19<sup>th</sup> century, to select generic names from mythology that may have no clear relation to the new taxon to be named. *Uduba*, named for an old name for a river in Spain, is one such case.

**Description.** Medium sized to very large spiders, total length 5.10–37.00; sexual dimorphism

slight (compare Figs. 1 A, B and 1 C, D), female chelicerae larger than male, male total length 5.10–26.00, female 6.10–37.00, male with relatively longer legs, ratio of femur I length/carapace width 1.10–1.71 in male, 0.62–1.26 in female, male with a tibial crack. Carapace elongate-oval in dorsal view (Figs. 3 A, C, D, F, 10 B), length 1.00 to 1.84 times width, domed (Figs. 3 G, H, 10 A), height 0.20 to 0.75 times width; fovea linear, deep. Ocular area broad, PER width 1.59–4.76 times OA length; ocular quadrangle rectangular to trapezoidal, in most specimens widest behind, OQP/OQA 0.91–1.48; eight eyes in 2 nearly straight rows (Fig. 3 D), indirect eyes with canoe-shaped tapetum (Fig. 12 D). Clypeus low to medium high, height 0.58 to 5.00 times AME diameter; chilum sclerotized, bipartite (Fig. 12 D). Chelicerae stout with large boss (Figs. 12 F, 15 B), length 3.09–18.00 times clypeal height, proand retromargins of fang furrow with 3 teeth, retromarginals evenly spaced, promarginals close together with largest in middle (Fig. 15 C); margin of fang furrow with a large escort seta at promarginal and retromarginal base of fang, with retromarginal row of rake setae and dense retromarginal mass of whisker setae (Fig. 15 C; Ramírez 2014, 36–38, fig. 15); cheliceral gland small; fang without clear separation between base and shaft, and without fang shaft serrula (Fig. 15 C). Labrum with tongue apex concave, with dense groups of setae laterally, dorsally on tongue, and apically, pin setae present anterior to tongue apex (Fig. 15 D). Palpal coxal endites nearly parallel (Figs. 3 B, E, 4 E, 15 G), length 1.94–3.00 times width, serula teeth in single row along outer margin (Fig. 15 F). Sternum length 1.07–1.63 times width (Figs. 3 B, E, 4 E). Labium long, with basal notch, length 1.19–1.67 times width (Figs. 10 C, 15 G). Leg formula 1423 or 4123 in females, 1423 or 4123 in males of most species, but a few have legs I and 4 equal in length; ratio of femur I length/carapace width 1.10–1.71 in male, 0.62–1.26 in female, ratio of femur IV length/carapace width 0.89–1.59 in male (Figs. 1 A, B, F), 0.69–1.34 in female (Figs. 1 C–D), ratio of metatarsus I length/carapace width 0.95–1.71 in male, 0.48–1.39 in female; integument smooth (Fig. 16 C) to finely wrinkled, most setae plumose (*sensu* Lehtinen 1976, Ramírez 2014) (Figs. 16 A–C) and with some feathery scales (Ramírez 2014) on legs and body (Fig. 16 C); chemosensory setae with bent, bare apex (Figs. 17 B, F); male leg tibiae with basal crack (Griswold, 1993 figs. 3, 4; Figs. 12C, 13D); trochanters with broad, shallow notch (Figs. 13 E, F). Spination, male basic pattern: femora of palpus and legs with dorsal row, apicolaterals may be present; patellae with or without lateral spines; tibiae and metatarsi I and II with ventral spines, typically 4 pairs under tibia and 3 beneath metatarsus (Figs. 12 C, 13 A), may be fewer, lateral spines present or absent; tibiae and metatarsi III and IV with ventral pairs and proand retrolateral spines, apex typically with ring of ventroapical pair and subapical pairs on proand retromargins (Figs. 13 B, 14 H), as is typical of most RTA-clade spiders (e.g., Ramírez 2014:138–139); tarsi without spines except some species, e.g., *U. andriamihajai* ♂ and *U. danielae* ♀, having a ventral spine beneath III and rarely IV. Spination, female basic pattern as in male except palpal tibia with prolateral spines, palpal tarsus with prolateral spines; lateral spines of tibiae and metatarsi typically fewer than in corresponding males. Details of spination of male and female of each species provided in that species description. Calamistrum rectangular-oval, arising sub-basally at 0.13–0.19 length of metatarsus and extending for about 1/3 length segment (length 0.25–0.45 length metatarsus), attenuate distally (Figs. 13 B, C, 14 G, H); calamistral setae with row of long teeth for most of setal length (Figs. 16 A, B). Trichobothria absent from leg femora and patellae, tibiae with a dorsobasal group, few prolaterals, and a retrolateral row extending to apex, metatarsi with a dorsal, irregular row, tarsi with dorsobasal trichobothrial row that divides into 2–3 rows apically (Figs. 14 C, D), palpal tibiae with proand retrolateral rows, in males extending dorsad and retrolaterad of RTA. Trichobothria absent from palpal tarsus, trichobothrial base with transversely-ridged hood (Figs. 17 D, E). Tarsal organ median to basal, capsulate, orifice keyhole-shaped or even deeply notched to form a stellate pattern (Figs. 17 C, G, H). Scopulae (Fig. 16 D–F) detailed in each

species description, typically beneath all tarsi and at least metatarsi I and II (Fig. 18 A), scopulae extend distad of tarsal apices, may obscure claws; dorsal scopulate patch on cymbium present in most species (Fig. 36 A, C, 56 A, C). Preening combs absent. Superior tarsal claws pectinate (Figs. 18 A, D, F), those of legs I and II with 8–12 teeth, those of legs III–IV with 3–7 teeth, inferior tarsal claws (ITC) simple, small (Figs. 18 A, D) or reduced to nubbins (Fig. 18 F) or absent; female palpus claw pectinate, with 3–10 teeth (Figs. 18 B, C); claw tufts absent (Figs. 18 D–F). Male palpal tibia with retroapical apophysis (RTA) and with a unique midventral, setose apophysis (VTA) and unique basoventral, sclerotized knob (UTA) at junction of tibia and patella. Palpal tarsus (Figs. 29 A–I) with cymbium with a dorsal scopulate patch; alveolus with large, triangular petiole (P) (Fig. 39 B); subtegulum (ST) cup-shaped, with 4–5 anelli (AN). Palpal bulb with elongate, threadlike embolus (E) arising from flexibly attached bulbous base (Eb) and extending dorsally behind subtegulum and tegulum to reappear from alveolus near alveolar apex (Figs. 32 B, F); bulb V-shaped with apicomedian notch, proapically an elongate, thick process (TA1) and a small process (TA2) of various forms at promedian margin of notch, retrolateral to notch a transverse process (TA3) of various forms, with stiff, hyaline conductor along its retroapical margin; flexibly attached median apophysis medial to apical near apicomedian notch. Pedicel with Lorum I longer than Lorum II, suture between these nearly straight (Figs. 12 E, 19 A, B). Abdomen oval, without scuta (Figs. 4 C, 7 A–L). Respiratory system comprising two anterior book lungs (Figs. 83A, 84C) and a single, small spiracle just anterior of cribellum leading into four simple tracheal tubes confined to abdomen (tracheal tubes examined in a male of *Uduba fisheri* and a juvenile of *Uduba salegyi*). Male epiandrous spigots absent (Fig. 19 C). Six spinnerets (Figs. 26 A–C), anteriors (ALS) and posterior laterals (PLS) two-segmented, posterior medians (PMS) one-segmented; ALS conical, PMS and PLS cylindrical, distal segment of PLS domed, short, less than 1/3 length basal segment. Anterior to spinnerets in AMS region a cribellum or a colulus (Figs. 20 A–G); if a colulus this is a broadly hemispherical fleshy mound with numerous setae (Figs. 20 D–F), colulus width 1.4 to 3.7 times length, ALS width 1.8–2.4 colulus width; cribellum, if present, entire (*U. funerea* Simon 1906 and *U. halabe*) (Fig. 20 A) or divided (all other cribellate species) (Figs. 20 B, C, G), cribellum width 2.00 to 5.50 times length, ALS width 1.35–2.00 times cribellum width; cribellar spigots arranged in small, widely separated groups (Figs. 23 A, C). We examined spigots in females and males of *Uduba madagascariensis* (Vinson, 1863), *U. fisheri*, *U. halabe*, and *U. schlingeri*. We present SEM images and data for *Uduba schlingeri* (Female CASENT9006075, male CASENT9006052). Female with ALS (Fig. 22 B) having two large major ampullate gland spigots (MAP) on mesal margin flanked by a large MAP tartipore (TP), and oval field of more than 60 piriform gland spigots (PI) interspersed with small TP; male (Fig. 21 B) with posteriormost MAP spigot reduced to nubbin (Nu), and with about 20 PI spigots interspersed with small TPs. Female PMS (Fig. 22 C) with apical Nu and two minor ampullate gland (mAP) spigots near apex, these with broad, flat bases and long, conical shafts, between and around these about 15 aciniform gland (AC) spigots, and posteriorly with 12–14 cylindrical gland (CY) spigots that have long, tapering bases and shafts, with several small TP in spinning field; male (Fig. 21 C) with ectal mAP reduced to a large Nu flanked by a large TP, CY absent, and about 16 AC spigots and TP in spinning field. Female PLS spinning field (Fig. 22 D) with 80 AC and a few TP, near apex a large elongate spigot that we classify as modified spigot (MS) or pseudoflagelliform (PsFl) plus two flanking spigots (Fls), with two nearby median CY and five basal CY; male (Fig. 21 D) with about 60 AC and a few TP, the PsFl and Fls replaced by nubbins. Examination by SEM of male and female specimens of *U. fisheri* (Anjozorobe, CASENT99026389) (Figs. 25 A, C) reveals a similar morphology: the ALS have fewer PI, 10 to 25, the PMS have only one mAP in female and male and four CY in the female, and the PLS have numerous AC spigots (about 50 in the male and



more than 100 in the female) but the female has only three CY. Finally, we examined the ecribellate *U. madagascariensis* (Vinson, 1863), (Ambohimanga, CASENT9006029) in 95% EtOH with light microscopy using a Leica MZ16 stereomicroscope. Although light microscopy does not afford us the sharp resolution of SEM, the spigot patterns are clear. The female *U. madagascariensis* has the ALS with two large MAP spigots on mesal margin, flanked by a large MAP tartipore (TP), and about 90 PI spigots interspersed with small TP; male with posteriormost MAP spigot reduced to Nu, and with about 20 PI spigots interspersed with small TPs. Female PMS with two mAP spigots near apex, these with broad, flat bases and long, conical shafts, between and behind these about 15 AC spigots, and posterobasally with about 10 CY spigots that have long, tapering bases and shafts, with several small TP in spinning field; male with ectal mAP reduced to a large Nu, CY absent, and about five AC spigots and TP in spinning field. Female PLS spinning field with 15 scattered AC and a few TP, with a median and four basal CY; male with ten scattered AC and a few TP. *Uduba* show a remarkable range of spinning organs. Within this genus different species are ecribellate (Figs. 20 D–F) or have divided (Figs. 20 B, C, G) or entire cribella (Fig. 20 A). The density of spigots may be sparse, e. g., only 20 PI in some *U. fisheri* to more than 100 PI in some *U. schlingeri*. Female genitalia with epigynal plate of various forms, convex and entire (Figs. 72 A, C, E, G) or with a median lobe (ML) surrounded by a depressed atrium (At) (Figs. 74 A, D, 75 A, C, D), copulatory openings (CO) exposed on plate or hidden laterally (in a few species medially) beneath lateral margins of atrium; LL tooth absent; vulva with sinuous spermathecae, typically forming at least one to as many as four spiral loops (Figs. 84 B, C); pores of spermathecal head (HS) difficult to locate (Figs. 83 C, 84 B), in many species hidden, but the spermathecal texture is typical of udubid spiders in having many fine pores throughout (Figs. 82 B, E, 83 D); fertilization ducts (FD) posterior (Figs. 68 B–D).

**Composition.** Thirty-nine species.

**Distribution.** Endemic to Madagascar (Figs. 85, 86, 87, Maps 1–20).

### Key to species of *Uduba*

- 1 Males ..... 2  
— Females ..... 28

#### Males

- 2(1) TA2 apex extends apicad of TA1 apex (Figs. 29 A, B) ..... 3  
— TA2 apex, if visible, does not extend apicad of TA1 apex (Fig. 29 C) ..... 5  
3(2) With a vestige of a divided cribellum (Fig. 20 C) ..... 4  
— Ecribellate, with a colulus (Fig. 20 D) ..... *Uduba evanescens* (Dahl, 1901a)  
4(3) TA3 is large and swollen (Fig. 29 A), basal lobe of MA entire with a concave margin, VTA is about equal to palpal tibia width (Figs. 54 A–C) ... *Uduba pseudoevanescens*, new species  
— TA3 small (Fig. 29 B), basal lobe of the MA deeply forked, VTA length much greater than palpal tibia width (Figs. 57 A–C) ..... *Uduba rakotofrah*, new species  
5(2) MA Trapezoidal (Fig. 29 I) ..... 6  
— MA otherwise (Figs. 29 A–H) ..... 7  
6(5) TA2 a curlicue (Figs. 29 I, 59 A) ..... *Uduba rinha*, new species  
— TA2 a spike (Figs. 46 A, B) ..... *Uduba irwini*, new species  
7(5) Thick, swollen VTA (Fig. 56 A); spine-like TA3 extends through a notch at the apex of the

tegulum, and with large, triangular MA (Fig. 29 G) .....	8
— VTA slender (Figs. 36 C, 41 A), TA3 various, but does not extend through a notch at the apex	
8(7) MA apex with two spikes (Figs. 55 A, C, 56 B, D, E) .....	<i>Uduba rajery</i> , new species
— MA apex with an apical lobe and spike (Figs. 58 A, C) .....	<i>Uduba rakotozafy</i> , new species
9(7) MA branched, complex (Figs. 29 H, 65 E), TA3 inconspicuous, palpal tibia with a stout spine (Figs. 40B, 44 A, 64 C) .....	10
— MA otherwise (Figs. 29 C–F, I), e.g., transverse, simple, TA3 visible, a hook, spike or screw, palpal tibia lacking stout spines (Figs. 30 A–C, 43 A–C) .....	12
10(9) Apex of TA2 angular (Figs. 28 A, C), palpal tibia lacking a stout retrospine .....	11
— Apex of TA2 evenly rolled (Fig. 28 B), palpal tibia with a stout retrospine (Fig. 64C) .....	<i>Uduba valiha</i> , new species
11(10) TA2 with apical lip (Fig. 28 A), MA apical, MA distal lobe truncate, proximal lobe broad .....	<i>Uduba hiragasy</i> , new species
— TA2 apically hyaline (Fig. 28 C), MA subapical, MA distal lobe rounded, proximal lobe very slender, tegulum with only weak ridge along retrolateral face (Figs. 40 A–C) .....	<i>Uduba fisheri</i> , new species
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— Retroapical surface of tegulum with swollen, desclerotized lobe near the base of TA3 and the conductor, TA3 and TA2 both curved, TA2 crosses in front of TA3 (Figs. 48 A–C) .....	<i>Uduba lakroa</i> , new species
13(12) TA2 highly sclerotized, may be shiny and dark to black, concave medially against TA3 (Figs. 29 E, 61 A, B) .....	14
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14(13) Ecribellate, with a colulus (Figs. 20 D–F) .....	15
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15(14) TA2 forming a chela around TA3 apex (Figs. 30 A–C) <i>Uduba andriamihajai</i> , new species	
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18(17) VTA short, length less than twice width, TA3 apex blunt, MA concave in middle with proximal sharp point, origin at 0.45 times tegulum length, total length = 9.00–12.40mm (Figs. 66 A–C) .....	<i>Uduba woodae</i> , new species
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— TA2 small, may be hidden by TA3 (Figs. 33 A, D) .....	<i>Uduba dahli</i> Simon 1903
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## Females

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- 51(50) Epigynum median lobe a flat plate, copulatory openings in posterior part of plate at 0.31 of epigynum length (Figs. 72 C, D) ..... *Uduba hiragasy*, new species
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- 52(49) ML broad, equal to or greater than spermathecal path width ..... 53  
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***Uduba andriamihajai*, new species**

Figures 6 B, 30 A, B, C; Maps 6, 14.

**Type material.** Holotype male (CASENT9010142) from malaise trap in forest at 1670m elevation at Korikory (20°23'04"S, 47°40'02"E), Fianarantsoa Province, Madagascar, collected 13 March 2000, M. E. Irwin and E. I. Schlinger (SI-001), deposited in CAS. Five paratype males, same data, (CASENT9064716, 3♂♂) (CASENT9006000, 1♂) and (CASENT9064717, 1♂), deposited in CAS.

**Etymology.** The species epithet is a patronym in honor of Dr. Benjamin Andriamihaja, biochemist and soil scientist, director of the Institute for the Conservation of Tropical Environments (ICTE), ardent conservationist and facilitator of science in Madagascar. His continuing assistance to our scientific research is gratefully acknowledged.

**Diagnosis.** *Uduba andriamihajai* are members of Group I.b, the *Uduba woodae* group (Map 14) of Group I, the Epigynal atrium group. Specimens are ecribellate, with a colulus. The male palp has the TA2 highly sclerotized, black, concave medially against TA3 and forming a chela around TA3 apex (Figs. 30 A, B, C). Males of *Uduba andriamihajai* can be distinguished from those of *Uduba schlingeri* in that the latter has a divided cribellum. Female unknown.

**Description.** Male (Holotype): Total length 10.00. Markings typical for *Uduba*, as in Fig. 6B. Carapace 5.60 long, 4.30 wide, 2.10 high; clypeus 0.24 high. Eye diameters: AME and ALE 0.20, PME and PLE 0.24. Chelicerae 2.60 long; sternum 2.60 long, 1.80 wide; labium 1.20 long; palpal coxae 1.90 long. With colulus. Spination (paratype, CASENT9064717): palpus – femur d0-1-2; leg I – femur d1-1-1, p0-0-2, r0-0-1, patella p1, tibia d0-0-1-1, p0-1-1-0, v1-2-2-2, r0-1-1-0, metatarsus p1-1-1, v1-1-1-1, r0-1-1-0; leg II – femur d1-1-1, p0-1-1-0, r0-1-1-0, patella p1, tibia d0-1-1-0, p0-1-1-0, v1-0-0-1, r0-1-1-0, metatarsus p0-1-1-0, v2-1-1-1, r0-1-1-0; leg III – femur d1-1-1, p0-1-1-1, r0-1-1-0, patella r1, tibia d0-1-0, p0-1-1-0, v2-0-2, r0-1-1-0, metatarsus p1-2-2, v2-1-2, r1-1-2, tarsus v0-1-0; leg IV – femur d1-1-1, p0-0-1, r0-0-1, tibia d0-1-0, p0-1-1-0, v2-1-3, r0-1-1-0, metatarsus p0-1-2, v2-2-2-2, r1-1-1-2. Scopulae: cymbium, apicodorsal; beneath all tarsi. Leg measurements (holotype): I: 5.50 + 2.10 + 5.80 + 6.00 + 3.10 = 22.50; II: 5.00 + 2.00 + 4.90 + 5.40 + 2.80 = 20.10; III: 4.40 + 1.70 + 2.90 + 4.20 + 2.20 = 15.40; IV: 5.70 + 1.70 + 5.60 + 6.80 + 2.90 = 22.70; palpus: 2.20 + 1.00 + 1.10 + NA + 2.60 = 6.90. Leg formula 4123. **Male palp** (holotype) (Figs. 30 A, B, C): palpal tibia 0.42 times cymbial length, RTA broadly triangular (Fig.

30 C), RTA length 0.30 tibia length, length equals width, with pointed apex, VTA length 1.67 times width, length 0.405 times tibia width, VTA cylindrical, straight, with rounded apex; tibia lacking stout spines; tegulum convex, without ridge, tegulum length 0.91 times width; TA1 extends distad of tegulum apex, TA1 extends past TA3 apex by 1.54 times tegulum length; TA3 transverse, tapering to a point, concave dorsally, TA3 apex straight, visible in front of TA2 (Figs. 30 B, C); TA2 highly sclerotized, black, concave medially against TA3, in this species forming a chela around TA3 apex (Fig. 30 A), base of TA2 with small bump just above MA base; MA transverse, concave in middle with proximal and distal enlargements, origin at 0.31 times tegulum length, tegulum apex at 0.29 tegulum length from MA apex, length (including apical processes) 0.72 times width, MA large, length 0.375 tegulum length, width 0.47 times tegulum width; conductor fan entire. **Female.** Unknown.

**Variation.** (N = 6): Total length = 9.50–14.00, carapace length / width = 1.33–1.69, carapace height / width = 0.44–0.57, PER / carapace width = 0.36–0.38, PER/OAL = 2.70–3.27, PER/AER = 1.30–1.40, OAL / OQL = 1.00–1.15, OQP / OQA = 1.11–1.24, clypeus height / AME = 1.14–1.54, cheliceral length / clypeus height = 8.00–10.80, sternum length / width = 1.24–1.50, palpal coxa length / width = 2.33–2.86, femur I length / carapace width = 1.28–1.38, metatarsus I length / carapace width = 1.36–1.49, femur IV length / carapace width = 1.31–1.38, cymbium length / carapace width = 0.59–0.71, cymbium length / palpal patella length = 2.60–3.56, cymbium length / palpal tibia length = 2.42–3.20, cymbium length / palpal femur length = 1.06–1.26, palpal tibia length / palpal patella length = 1.10–1.30.

**Material examined.** MADAGASCAR: locality unknown (CASENT9006076, 2♂, FMNH). *Fianarantsoa Province*: Korikory, SE of Fandriana, 20°23'04"S, 47°40'02"E, elev. 1670m, 13 March 2000, M. E. Irwin and E. I. Schlinger [SI-001] (Holotype, CASENT9010142, 1♂, CAS), (Paratypes, CASENT9064716, 3♂, CAS), (Paratype, CASENT9064717, 1♂, CAS), (Paratype, CASENT9006000, 1♂, CAS); RNI Andringitra, Anjavidilay, 8.5 km SE Atanifotsy, 22°09.5'S, 46°57.6'E, elev. 1990m, pitfall trap in *Philippia*-dominated sclerophyllus forest, 5–11 March 1997, S. E. Goodman (CASENT9064648, 12♂, FMNH); R. S. de Ivohibe, at source of Andranomainity River, 6.5 km ESE Ivohibe, S22.496°, E46.955°, Camp 3, elev. 1575m, pitfall trap, undisturbed mossy forest, 24–30 October 1997, S. E. Goodman [SEG1997] (CASENT9006077, 1♂, FMNH). *Toamasina Province*: Réserve Nationale Intégrale Betampona, Betampona, 35.1 km NW Toamasina, 17°54'58"S, 049°12'07"E, elev. 550m, rainforest, malaise trap, 25 May–1 June 2008, B.L. Fisher [BLF19593\_23] (CASENT9042359, 1♂, CAS).

**Natural history.** The ecribellate species *Uduba andriamihajai* is known only from males collected in pitfall and malaise traps, suggesting that these spiders wander on the ground and up into vegetation when mature. Nothing is known of their use of silk. Most records are from high elevations: from 550m in rainforest to 1575m and 1670m in rainforest and mossy forest, even extending to high-elevation *Philippia*-dominated sclerophyllus forest at 1990m at Andringitra in southeastern Madagascar.

**Distribution.** The species *Uduba andriamihajai* is recorded from rainforest along the mountain spine of central-east Madagascar and even from high elevation sclerophyll vegetation. One record, from Réserve Nationale Intégrale Betampona, is from an isolated remnant patch of forest (Maps 6, 14).

#### *Uduba balsama*, new species

Figures 31 A–C, 32 A–F, 74 D–E, Maps 11, 14.

**Type material.** Holotype male (CASENT9030929) from malaise trap in deciduous spiny forest at 825 m elevation in Zombitse National Park, 22°50.43'S, 44°43.87'E, Toliara Province, Mada-

gascar, collected 11–16 April 2002 by M. E. Irwin, F. D. Parker and R. Harin'Hala, deposited in CAS. Paratype female (CASENT9013532) from tropical dry forest at 100m elevation in Forêt de Kirindy, 20°2'42"S, 44°39'44"E, collected 28 November to 3 December 2001 by the Fisher-Griswold Arthropod Team, deposited in CAS.

**Etymology.** The species epithet honors Mrs. Balsama Rajemison, curator of the collection of Entomology at the Parc Botanique et Zoologique de Tsimbazaza (PBZT), Lakeside International Scholar and member of the Fisher-Griswold arthropod team at the California Academy of Sciences. She is gratefully acknowledged for her hospitality in her home country and for her essential efforts in securing permissions and permits for research and collecting in Madagascar. Name treated as a noun in apposition.

**Diagnosis.** *Uduba balsama* are members of Group I.b, the *Uduba* woodae group (Map 14) of Group I, the Epigynal atrium group. They are ecribellate *Uduba*, with a colulus; male palp with TA2 highly sclerotized, black, concave medially against TA3 but not forming a chela around TA3 apex, TA3 reflexed (Figs. 31 A–C); female epigynal plate with median lobe surrounded by depressed atrium, plate extensive posteriad of atrium, plate height greater than 0.15 times epigynal length, median lobe broad, bell-shaped, atrium nearly twice ML width, ML and atrium apices nearly at same level (Figs. 74 D–E).

**Description. Male** (Holotype): Total length 10.50. Markings typical for *Uduba*. Carapace 5.60 long, 4.25 wide, 2.40 high; clypeus 0.30 high. Eye diameters: AME 0.20, ALE and PLE 0.22, PME 0.20. Chelicerae 2.50 long; sternum 2.50 long, 2.00 wide; labium 1.20 long; palpal coxae 1.80 long. With a colulus. Spination: Palpus – femur d0-1-1, p0-0-1, r0-0-1; leg I – femur d1-1-1, p0-1-2, r0-1-0-1, patella p1, r1, tibia d0-0-0-1, p0-1-1-0, v2-2-2-2, r0-1-1-0, metatarsus p1-1-2, v2-2-1, r1-1-2; leg II – femur d1-1-1, p0-1-1, r0-1-1, patella p1, r1, tibia d0-0-1, p0-1-1-0, v2-2-2-2, r0-1-1-0, metatarsus p1-1-2, v2-2-1, r1-1-2; leg III – femur d1-1-1, p0-0-1-1, r0-1-1-1, patella p1, r1, tibia d1-0-1-0, p0-1-1-0, v2-2-2, r0-1-1-0, metatarsus p1-2-2, v1-2-2-2, r1-1-2; leg IV – femur d1-1-0-1, p0-0-0-1, r0-0-0-1, patella p1, r1, tibia d0-1-1-0, p0-1-0-0, v2-2-2, r0-1-1-0, metatarsus p1-1-2, v1-1-1-2-2, r1-1-2. Scopulae: cymbium, apicodorsal; beneath tarsi and apices of all metatarsi. Leg measurements: I:  $5.10 + 2.10 + 5.10 + 5.30 + 3.40 = 21.00$ ; II:  $4.60 + 2.00 + 4.10 + 4.80 + 2.90 = 18.40$ ; III:  $4.00 + 1.50 + 2.70 + 4.30 + 2.30 = 14.80$ ; IV:  $5.20 + 1.80 + 4.80 + 6.80 + 3.00 = 21.60$ ; palpus:  $2.10 + 0.80 + 1.00 + \text{NA} + 3.10 = 7.00$ . Leg formula 4123. **Male palp** (Figs. 31 A–C): palpal tibia 0.33 times cymbial length, RTA broadly triangular, RTA length 0.375 tibia length, length 1.33 times width, curved ventrally to pointed apex; VTA curved, with rounded apex (Figs. 31 A, C), VTA length 2.28 times width, length 0.30 times tibia width; tibia lacking stout spines; tegulum convex, without ridge, tegulum length 0.94 times width; TA1 extends distad of tegulum apex, TA1 extends past TA3 apex by 1.36 times tegulum length; TA3 transverse, concave dorsally, tapering to a blunt, upturned point, TA3 apex visible beside TA2; TA2 highly sclerotized, black, concave medially against TA3 (Fig. 32 E); MA transverse, concave, simple, origin at 0.51 times tegulum length, tegulum apex at 0.31 tegulum length from MA apex, length (including apical processes) 0.36 times width, MA small, length 0.18 tegulum length, width 0.46 times tegulum width; conductor fan entire (Figs. 32 A–F). **Female** (Paratype): Total length 14.20. Markings typical for *Uduba*. Carapace 7.40 long, 4.50 wide, 2.70 high; clypeus 0.40 high. Eye diameters: AME 0.20, ALE and PME 0.22, PLE 0.26. Chelicerae 3.30 long; sternum 2.90 long, 2.40 wide; labium 1.60 long; palpal coxae 2.20 long. **Ratios:** carapace length / width = 1.64, carapace height / width = 0.60, PER / carapace width = 0.45, PER / OAL = 3.00, PER / AER = 1.36, OAL / OQL = 1.10, OQP / OQA = 1.07, clypeus height / AME diameter width = 2.00, cheliceral length / clypeus height = 8.25, sternum length / width = 1.21, palpal coxa length / width = 2.00, femur I length / carapace width = 0.98, metatarsus I length / carapace width = 0.69, femur IV length / carapace width = 1.07,

palpal tarsus length / carapace width = 0.47, palpal tibia length / palpal patella length = 1.91, palpal tarsus length / palpal tibia length = 1.75, palpal tarsus length / palpal femur length = 0.95, palpal tibia length / palpal patella length = 1.09. With a colulus. Spination: palpus – femur d0-0-2, patella p1, tibia p0-1-0, tarsus p2-1, v0-0-1; leg I – femur d1-0-1, p0-0-1, tibia v2-2-2-2, metatarsus v2-2-3; leg II – femur d1-0-0, p0-0-1, tibia p0-0-1, v1-1-1-2, metatarsus v2-2-3; leg III – femur d1-0-0-1, p0-0-1-2, r0-0-0-1, tibia d1-1-0-0, p0-1-1-0, v1-1-2, r0-1-1-0, metatarsus p1-2-2, v2-2-2, r1-2-2, tarsus v0-1-0; leg IV – femur d1-1-1, r0-0-1, tibia p1-0-0, v1-1-2, r0-1-1-0, metatarsus d0-1-0-0, p1-1-1-2, v1-1-2-2, r1-1-1-2. Scopulae: strong ventral beneath all tarsi, beneath metatarsus I and apical half of metatarsus II and apices of metatarsi III and IV. Leg measurements: I:  $4.40 + 2.30 + 3.60 + 3.10 + 2.10 = 15.50$ ; II:  $4.00 + 2.10 + 2.90 + 2.60 + 1.90 = 13.50$ ; III:  $3.10 + 1.90 + 2.00 + 2.70 + 1.60 = 11.30$ ; IV:  $4.80 + 1.90 + 3.70 + 4.70 + 2.20 = 17.30$ ; palpus:  $2.20 + 1.10 + 1.20 + \text{NA} + 2.10 = 6.60$ . Leg formula 4123. **Female genitalia:** epigynal plate (Fig. 74 D) with median lobe surrounded by depressed atrium, plate width 1.125 times length; atrium sides nearly straight, atrium width 2.08 times atrium length; epigynum length 3.33 times atrium length, atrium width 0.56 times epigynum width; atrium width at side of ML 0.50 times ML width; atrium and median lobe arise well anterior of epigastric groove, atrium origin at 0.425 of epigynal plate length, median lobe triangular, broadest at base, median lobe length 1.08 times width, ML apex near atrium apex, ML length 0.35 times epigynal length; lateral lobes narrow, atrium width 3.125 times LL width; copulatory openings hidden beneath posterolateral margin of atrium, distance between CO 0.55 times width of epigynal plate, CO distance from epigastric furrow 0.425 times epigynum length. Vulva (Fig. 74 E) with spermathecal ducts making four tight, transverse curves, vulva length 0.73 times width, fertilization ducts widely separated, vulva width 3.67 times distance between fertilization ducts.

**Variation.** **Male** ( $N = 3$ ): Total length = 10.50–12.00, carapace length / width = 1.31–1.45, carapace height / width = 0.46–0.56, PER / carapace width = 0.36–0.39, PER / OAL = 2.70–3.11, PER / AER = 1.33–1.36, OAL / OQL = 1.00–1.04, OQP / OQA = 1.08–1.19, clypeus height / AME diameter width = 0.83–1.36, cheliceral length / clypeus height = 8.33–15.00, sternum length / width = 1.18–1.26, palpal coxa length / width = 2.38–3.00, femur I length / carapace width = 1.20–1.26, metatarsus I length / carapace width = 1.25–1.31, femur IV length / carapace width = 1.22–1.36, cymbium length / carapace width = 0.63–0.73, cymbium length / palpal patella length = 3.00–3.88, cymbium length / palpal tibia length = 3.00–3.38, cymbium length / palpal femur length = 0.94–1.48, palpal tibia length / palpal patella length = 1.00–1.25. **Female** variation is unknown: the female is known from the single paratype specimen.

**Material examined.** MADAGASCAR: *Antsiranana Province*: R. N. de Marojejy, 10 km NW Manantenina, along tributary of Manantenina River, Camp 2, 14°26.0'S, 49°44.7'E, elev. 775m, pitfall in relatively undisturbed lowland-montane rainforest, 14–23 October 1996, S. Goodman, (CASENT9064659, 2♂, FMNH), R. N. de Marojejy, 8 km NW Manantenina, along tributary of Manantenina River, Camp 1, 14°26.2'S, 49°46.5'E, elev. 450m, pitfall in relatively undisturbed lowland rainforest, 4–13 October 1996, S. Goodman (CASENT9064654, 1♂, FMNH). *Mahajanga Province*: Parc National Bemaraha, S bank Manambolo River, Tombeau Vazimba, 3.5 km E Bekopaka, 19°8'24"S, 44°49'2"E, elev. 100m, pitfall traps, 30 November–6 December 2001, S.M. Goodman, (FMNH2001-91) (FMNH-INS 0000 044 665, 1♂, FMNH). *Toliara Province*: Zombitse National Park, near national road, 22°50.43'S, 44°43.87'E, elev. 825m, malaise trap, deciduous spiny forest, 11–16 April 2002, M. E. Irwin, F. D. Parker and R. Harin'Hala [MA-02-13B-24] (Holotype, CASENT9030929, 1♂, CAS); Forêt de Kirindy, 15.5 km 64°ENE Marofandilia, 20°2'42"S, 44°39'44"E, elev. 100m, tropical dry forest, pitfall trap, 28 November–3 December 2001, Fisher-Griswold Arthropod Team [BLF4600] (CASENT9000543, 1♂, CAS), general col-

lecting ground spiders, Fisher-Griswold Arthropod Team [BLF4682] (Paratype, CASENT9013532, 1♀, CAS); Makay Mts., 21°13'06"S, 045°18'38"E, elev. 510m, yellow pan traps in gallery forest on sandy soil, 24 November–1 December 2010, B. L. Fisher *et al.*, [BLF25203] (CASENT9042528, 1♂, CAS).

**Natural history.** The species *Uduba balsama* is unusual among *Uduba* in its occurrence in some of the drier areas of Madagascar. Individuals have been collected in dry habitats in southwestern Madagascar, i.e., from a malaise trap in deciduous spiny forest at 825 m elevation in Zombitse National Park and by general collecting (method unspecified) and from pitfall traps from tropical dry forest at 100m elevation in Forêt de Kirindy and from yellow pan traps in gallery forest on sandy soil in the Mackay Mountains. Other possibly conspecific individuals have been collected with pitfall traps in relatively undisturbed lowland rainforest from 400–800m near Marojejy in northeastern Madagascar. Data suggest that at least mature males wander on the ground and up into vegetation, where they are collected by malaise traps. We know nothing of the use of silk by these ecribellate spiders.

**Distribution.** *Uduba balsama* are widely distributed in the drier parts of western Madagascar with at least one outlier from wet rainforest in the northeast (Maps 11, 14).

#### *Uduba barbarae*, new species

Figures 7 H, 10 A–C, 76 A, B, Maps 4, 15.

**Type material.** Holotype female (CASENT9006067) and four paratype females (CASENT9006064, CASENT9006066, CASENT9006068 and CASENT9006069), collected along forest trails in Lokobe Forest, near sea level on the island of Nosy Be (13°24'58.8"S, 48°18'26.5"E), 11–14 August 1992 by Vince and Barbara Roth [VR0003], deposited in CAS.

**Etymology.** The species epithet is to honor Mrs. Barbara Roth, collector of this and many other interesting arachnids in Madagascar.

**Diagnosis.** *Uduba barbarae* are members of Group I.c, the *Uduba funerea* group (Map 15) of Group I, the Epigynal atrium group. They are ecribellate, with a colulus (Figs. 10 A–C); female with epigynal plate with median lobe surrounded by depressed atrium, ML fills most of atrium, atrium width at side of ML only 0.14 ML width, plate extensive posteriad of atrium, height greater than 0.15 times epigynal length; median lobe broad, width atrium less than 3 times ML width (Figs. 76 A, B). Male unknown.

**Description. Male:** Unknown. **Female** (Holotype, CASENT9006067): Total length 28.43. Markings as in Figs. 7 H, 10 A–C. Carapace 15.71 long, 10.86 wide, 5.71 high; clypeus 1.00 high. Eye diameters: AME 0.50, ALE 0.45, PME 0.43, PLE 0.54. Chelicerae 8.14 long; sternum 6.43 long, 4.50 wide; labium 3.39 long; palpal coxae 5.54 long. With a colulus. Spination: (Holotype): palpus – femur d0-1-2, patella p1-0, tibia p2-1, r1-0, tarsus p2-1, r1-0; leg I – femur d1-0-0, p0-0-2, tibia v2-2-2-2, metatarsus v2-2-3; leg II – femur d0-1-0-1, p0-0-0-1, tibia p0-1-1-0, v2-1-2-2, metatarsus v2-2-3; leg III – femur d1-0-0-1, p1-1-0-1-1, r0-1-1-1, tibia d1-0-0-1, p0-1-1-0, v2-2-2, r0-1-1-0, metatarsus p1-1-2, v2-1-2-2, r1-1-2, tarsus v0-1-0; leg IV – femur d1-1-0-1, p0-1-0-1, r0-0-0-1, tibia p0-1-1-0, v2-2-2, r0-1-1-0, metatarsus p1-1-1-2, v2-1-2-2, r1-1-1-2. Scopulae: ventral on tarsi and metatarsi I–IV and tibia I, apical half of tibia II, and apices tibiae III and IV. Leg measurements [Holotype]: I:  $12.36 + 5.21 + 9.00 + 7.86 + 4.29 = 38.71$ ; II:  $9.71 + 5.07 + 7.86 + 8.14 + 4.00 = 34.79$ ; III:  $8.21 + 4.29 + 5.00 + 6.79 + 3.07 = 27.36$ ; IV:  $10.57 + 4.64 + 8.71 + 11.14 + 4.57 = 39.64$ ; palpus:  $5.79 + 2.93 + 3.07 + \text{NA} + 5.00 = 16.79$ . Leg formula 4123. **Female genitalia** (paratype, CASENT9006066): epigynal plate with median lobe surrounded by depressed atrium; epigynal plate narrow (Figs. 76 A), width equals length; atrium sides narrow, atrium width 1.67 times atrium length; epigynum length 3.33 times atrium length, atrium width 0.50 times epig-



ynum width; ML fills most of atrium, atrium width at side of ML only 0.14 ML width; atrium and median lobe anteromedian, arise at 0.30 epigynum length from epigastric groove; median lobe broad, triangular, median lobe length 1.49 times width, ML length 1.67 times atrium length, 0.50 times epigynal length, ML width 0.70 atrium width, ML apex extends far anterior of atrium apex by nearly one-half ML length; lateral lobes broad, atrium width 2.00 times LL width; copulatory openings beneath anterolateral margins of atrium. Vulva (Figs. 76 B) with spermathecal ducts making at least four broad spiral curves, vulva length 0.75 times width, fertilization ducts close together, vulva width 12.00 times distance between fertilization ducts.

**Variation. Female** (N = 5): Total length 21.00–33.14. Carapace length / width = 1.38–1.47, carapace height / width = 0.47–0.56, PER / carapace width = 0.40–0.80, PER / OAL = 1.59–3.27, PER / AER = 2.73–3.27, OAL / OQL = 1.00–1.13, OQP / OQA = 1.03–1.13, clypeus height / AME diameter width = 1.57–2.56, cheliceral length / clypeus height = 6.67–10.50, sternum length / width = 1.30–1.43, palpal coxa length / width = 2.03–2.41, femur I length / carapace width = 0.94–1.14, metatarsus I length / carapace width = 0.71–0.76, femur IV / carapace width = 0.94–1.05, palpal tarsus length / carapace width = 0.41–0.49, palpal tarsus length / palpal patella length = 1.50–1.73, palpal tarsus length / palpal tibia length = 1.33–1.67, palpal tarsus length / palpal femur length = 0.81–0.95, palpal tibia length / palpal patella length = 1.03–1.18. **Male** variation is unknown.

**Material examined.** MADAGASCAR: *Antsiranana Province*: Ankarana, English camp, 12°54'34"S, 49°6'36"E, "3cm diameter hole x 16cm deep in trail, few leaves around entrance tied by few silken threads", 20–26 August 1992, V. and B. Roth (CASENT9006065, 1♀, CAS); Nosy Be, Lokobe Forest, 13°24'58.8"S, 48°18'26.5"E, "in 5/8" x 4-6" burrow on forest trail", 11–14 August 1992, V. and B. Roth (paratype, CASENT9006064, 1♀, CAS), (paratype, CASENT9006066, 1♀, CAS), (holotype, CASENT9006067, 1♀, CAS), (paratype, CASENT9006068, 1♀, CAS), (paratype, CASENT9006069, 1♀, CAS).

**Natural history.** Specimens of *Uduba barbarae* were collected in lowland rainforest. This ecribellate species forms deep burrows with a small amount of silk near the entrance.

**Distribution.** *Uduba barbarae* are known only from the island of Nosy Be and western coastal Antsiranana Province in northern Madagascar (Maps 4, 15).

### *Uduba dahli* Simon, 1903

Figures 33 A–D, 34 A–F, Maps 2, 13.

*Marussencia madagascariensis* Dahl, 1901b: 248 (preoccupied in *Uduba*).

*Uduba dahli* Simon, 1903, replacement name for *Marussencia madagascariensis* Dahl, 1901b, a secondary homonym; lectotype female, (ZMB25276a) and paralectotype male (ZMB25277a), **here designated**, Museum für Naturkunde, Berlin, examined. Griswold (1993) P. 7: Table 1. Exemplars: this is the list of exemplar taxa: *Uduba dahli* Simon, 1903 (*Marussencia madagascariensis* Dahl, 1901b): male and female syntypes, Madagascar, Braun, ZMB (Miturgidae, Uliodoninae). Lehtinen, 1967: 272, 437, fig. 80 male palp: det. as *dahli*, = this is probably a syntype of *Marussencia madagascariensis*, which Lehtinen did examine, and so it is determined as *U. dahli* Simon 1903.

**Types.** The syntype series of *Marussencia madagascariensis*, which we borrowed from Museum für Naturkunde, Berlin, comprises many fragmentary specimens and one whole female and one whole male. The series comprises two slides of separated parts, ZMB25276 and ZMB 4357, two alcohol preserved subadult females, Syntype ZMB25276 b and ZMB25276 d, a whole male specimen, ZMB25277a, and a whole female specimen, ZMB25276a (Figs. 34 A–G). These whole specimens we here designate as lectotype and paralectotype of *Uduba dahli* Simon 1903: lectotype female for specimen ZMB25276a; *Uduba dahli* Simon 1903, paralectotype male for specimen ZMB25277a. Other specimens remain as syntypes.

The entire syntype series of *Marussenca madagascariensis* Dahl 1901b, comprises: **25276a**— Syntype ZMB25276a — This is a whole female specimen: the specimen has a vulva and spinnerets with a divided cribellum (Figs. 34 A–G). Five labels in the tube read “syntypus” [in red]; “ZMB25276,” “[illegible] female,” “Zool. Mus. Berlin Kat. # 25276a; species *Marussenca madagascariensis* F. Dahl; Fundort: 2 females plus vulva syntypus [illegible] Madagascar; leg. Hildebrandt; det. F. Dahl 1901” [note: the “Hildebrandt” might be a mistake] and “29,5 28,5 19,5 28,5 female male 44, 38, 32 45” [these appear to be leg measurements]. We illustrate the epigynum and vulva (Figs. 33 B, C). We designate this female as lectotype of *Uduba dahli* Simon 1903. **25276a**— **ZMB25276a** — A slide mount labelled “25276a” is especially interesting. There are some mounted legs from a female, and the collector’s name is listed as “Braun” [not ‘Hildebrandt’]. **25276 b** — Syntype ZMB25276 b: this is a whole subadult female, broken into pieces, and note that the label has been changed to read “Braun.” **25276 c** — Syntype ZMB25276 c: this is a whole subadult female and note that again the label has been changed to read “Braun.” **25276 d** — Syntype ZMB25276 d: this is another whole subadult female, and note that again the label has been changed to read “Braun.” **25276e** — **ZMB\_25276e\_a** *Marussenca madagascariensis*: this type comprises a set of juvenile legs on a slide; labelled “Syn Typus” and “Hildebrandt.” **25277a** — Syntype ZMB25277a — This whole male specimen is ZMB25277a. There are three labels: one reading “syn Typus”, one reading “Madagaskar” and one giving the species name and that states “leg. Hildebrandt; and “det. F. Dahl 1901”. We have made sketches, a spine map and taken measurements. The palp is illustrated in prolateral and ventral views (Figs. 33 A, D). We designate this male as paralectotype of *Uduba dahli* Simon 1903. **4357** — **ZMB 4357**, a juvenile from south central Madagascar, labeled” Hildebrandt” — Fragmentary juvenile syntypes ZMB4357\_juv\_syntype\_2306.

**Identification.** We have examined the syntype series of *Marussenca madagascariensis* Dahl, 1901b, which we received on loan from Berlin. The series of specimens is a complex array of whole specimens and slide-mounted fragments, which are difficult to interpret. Among the syntypes is a whole female adult (ZMB25276a) that has a divided cribellum (Fig. 34 C) and an epigynum with atrium and central median lobe (Figs. 33 B, 34 D); the copulatory openings are hidden at the sides of the atrium. Associated with this is a whole male adult (ZMB25277a) that has a large, screw shaped TA3, a small, inconspicuous TA2, a small, simple, transverse MA (Figs. 33 A, D) and vestige of a divided cribellum. This male palp is similar to those of *U. halabe*, which is distinguished in having an entire cribellum, and *U. platnicki*, which is distinguished in being ecribellate. Lehtinen (1967) also examined the type series of *Marussenca madagascariensis* and accepted the identification as *U. dahli* Simon 1903. Lehtinen (1967) p. 437, fig. 80 illustrated a male palp: this is probably a syntype of *Marussenca madagascariensis* and we agree with his determination of this as *Uduba dahli*.

**Synonymy.** The type females of *Marussenca madagascariensis* Dahl, 1901b (for which Simon proposed the replacement name *Uduba dahli* Simon 1903) and of *Uduba funerea* Simon 1906, differ in that the former has a divided cribellum and the latter an entire cribellum. Simon apparently never examined Dahl’s syntype series and was not aware of the cribellum difference. Simon (1906: 293) states that “*Sp. invisa U. Dahli E. Simon (Marussenca madagascariensis Dahl, nom. praeoccup.)*” Lehtinen (1967: 272) proposed the synonymy of *Uduba funerea* Simon 1906, with *Uduba dahli* Simon 1903 but, based on our observations of the different cribellum forms (entire vs. divided) in the types for these two names, we must reject the synonymy.

**Remarks.** In 1903 Simon described the new genus *Uduba*, designating as type species *Olios madagascariensis* Vinson, 1863. Simon (1903) recognized that another species, *Marussenca madagascariensis* Dahl, 1901b, also belonged to *Uduba*, which created a homonym. He provided

the replacement name *Uduba dahli* Simon, 1903. Simon (1903: 975) stated “J’ai rapporté à tort l’*Olios madagascariensis* Vinson, type du genre *Uduba*, au genre *Uliodon* (t. II, p. 112); il faut dire que le calamistrum et le cribellum, déjà peu apparents chez la femelle, sont indistincts chez le mâle, seul sexe que je connaissais jusqu’ici. Les *Uduba* sont presque des *Uliodon* à cribellum et calamistrum rudimentaires. On en connaît deux espèces de Madagascar, *U* (*Olios*) *madagascariensis* Vinson, et *U. Dahli* E. Simon (*Marussencia madagascariensis* Dahl)” (OUR TRANSLATION: I have wrongly referred *Olios madagascariensis* Vinson, type of the genus *Uduba*, to the genus *Uliodon* (t. II, p. 112); it must be said that the calamistrum and the cribellum, already little apparent in the female, are indistinct in the male, the only sex that I have known so far. The [cribellum and calamistrum of] *Uduba* are almost rudimentary. Two species are known from Madagascar, *U* (*Olios*) *madagascariensis* Vinson, and *U. Dahli* E. Simon (*Marussencia madagascariensis* Dahl).

Later Simon (1906) studied all *Uduba*, described a new species *Uduba funerea* for a female from Suberbieville in Mahajunga Province and provided a key to the *Uduba* species that he knew, *U. madagascariensis* (Vinson, 1863), *U. dahli* Simon 1903 and the new species *U. funerea* Simon 1906. He states (Simon, 1906: 293) “*Plaga genitalis* haud foveolata, *plagula* acute triquetra antice munita. ... *U. MADAGASCARIENSIS* Vinson... *Plaga genitalis* fovea subrotunda, *carinula* alla *temui* *divisa*, *impressa*. ... *U. FUNEREA* E. Sim.” (OUR TRANSLATION: The distinct epigyna of the two species, a triangular plate in *U. madagascariensis* and a subrotund, divided fovea in *U. funerea*, are diagnostic). Crucially, he states “*Sp. invis*a *U. Dahli* E. Simon (*Marussencia madagascariensis* Dahl, *nom. praeoccup.*).” Simon seems not to have seen Dahl’s specimens of *Marussencia madagascariensis*, for which name he provided the replacement *Uduba dahli* Simon, 1903.

**Diagnosis.** *Uduba dahli* are members of Group I.a, the *Uduba dahli* group (Map 13) of Group I, the Epigynal atrium group. They are cribellate, with cribellum divided (Fig. 34 C). Males of *Uduba dahli* can be distinguished from those of other *Uduba* by having a large, screw-shaped TA3, an inconspicuous TA2, and a small, simple MA (Figs. 33 A, D). The male palp is very similar to that of *Uduba halabe* but the latter has a vestige of an entire cribellum, whereas the male of *Uduba dahli* has a vestige of a divided cribellum. The females of *Uduba dahli* can be distinguished from those of other *Uduba* having an epigynal plate with median lobe surrounded by depressed atrium (Figs. 33 B, C); the divided cribellum (Fig. 34 C) is unlike those in *U. funerea* and *U. halabe*, (Fig. 20 A). The position of the CO beneath the lateral margins of the atrium (Figs. 33 B, C) (not beneath the median lobe) also distinguishes this species from *U. halabe*.

**Description.** Male (paralectotype of *Marussencia madagascariensis* Dahl 1901b, syntype male, Berlin = paralectotype of *Uduba dahli*): Total length 18.00. Markings as in female (Figs. 34 A, B). Carapace 10.21 long, 7.57 wide, 3.57 high; clypeus 0.71 high. Eye diameters: AME and ALE 0.36, PME 0.41, PLE 0.43. Chelicerae 2.71 long; sternum 4.43 long, 3.29 wide; labium 1.71 long; palpal coxae 3.11 long. Ratios: carapace length / width = 1.35, carapace height / width = 0.47, PER / carapace width = 0.36, PER/OAL = 2.90, PER/AER = 1.34, OAL/OQL = 1.06, OQP/OQA 1.10, clypeus height / AME = 2.10, cheliceral length / clypeus height = 6.00, sternum length / width = 1.29, palpal coxa length / width = 2.40, femur I length / carapace width = 1.26, metatarsus I length / carapace width = 1.41, femur IV length / carapace width = 1.30, cymbium length / carapace width = 0.64, cymbium length / palpal patella length = 3.09, cymbium length / palpal tibia length = 3.40, cymbium length / palpal femur length = 1.36, palpal tibia length / palpal patella length = 0.91. Cribellum vestige divided. Spination: palpus – femur d0-0-1-1, p0-0-0-1, r0-0-0-1; leg I – femur d1-0-0-1, p0-0-1-2, r1-1-0-1, patella p1, tibia d0-0-0-1, p0-1-1-0, v2-2-2-2, metatarsus p1-0-0, v2-2-3; leg II – femur d1-1-1, p1-1-1-1, r0-1-0-1, patella p1, tibia d0-0-1, p0-1-1-0, v2-2-2-2, metatarsus p1-0-0, v2-2-3, r1-0-0; leg III – femur d1-1-0-1, p1-0-1-1, r0-1-1-1, tibia

d0-1-0, p0-1-1-0, v2-2-2, r0-1-1-0, metatarsus d0-1-0, p1-1-2, v2-2-2, r1-1-2; leg IV – femur d1-1-0-1, p0-1-0-1, r0-0-0-1, tibia p0-1-1-0, v2-2-2, r0-1-1-0, metatarsus, p1-1-1-2, v1-1-1-1-2, r1-1-1-2. Scopulae: cymbium, apicodorsal; strong beneath all tarsi and apices of metatarsi I and II, weak beneath apices of metatarsi III and IV. Leg measurements: I:  $9.57 + 3.86 + 9.29 + 10.71 + 5.00 = 38.43$ ; II:  $8.57 + 3.57 + 7.71 + 9.36 + 4.57 = 33.79$ ; III:  $6.86 + 3.29 + 4.50 + 8.29 + 3.43 = 26.36$ ; IV:  $9.86 + 3.36 + 8.57 + 12.29 + 4.71 = 38.79$ ; palpus:  $3.57 + 1.57 + 1.43 + \text{NA} + 4.86 = 11.43$ . Leg formula 4123. **Male palp:** palpal cymbium 4.40 times tibia length, RTA broad, triangular, RTA length 0.50 tibia (Fig. 33 D), RTA length equals width, apex a blunt point, VTA length 2.00 times width, a short finger-like projection, length 0.25 tibia width; tibia lacks stout spines; tegulum convex, without ridge, tegulum length 1.07 times width; TA1 extends distad of tegulum apex, TA1 extends past TA3 apex by 1.10 times tegulum length; TA3 very large, screw-shaped with subapical grooves (Fig. 33 A), TA2 a small, simple mound, hidden behind TA3 apex; MA small, simple, length (including apical processes) 0.45 times width, MA length 0.17 tegulum length, width 0.34 tegulum width, origin at 0.34 tegulum length; conductor fan entire (Fig. 33 A). **Female** (lectotype of *Marussenca madagascariensis* Dahl 1901 syntype female, Berlin = lectotype of *Uduba dahl*): Total length 21.43. Markings as in Figs. 34 A–F. Carapace 9.14 long, 6.29 wide, 3.57 high; clypeus 0.64 high. Eye diameters: AME 0.34, ALE and PME 0.32, PLE 0.36. Chelicerae 5.29 long; sternum 4.21 long, 3.29 wide; labium 1.71 long; palpal coxae 3.11 long. **Ratios:** carapace length / width = 1.45, carapace height / width = 0.57, PER / carapace width = 0.42, PER/OAL = 3.42, PER/AER = 1.34, OAL/OQL = 1.00, OQP/ OQA = 1.02, clypeus height / AME = 1.95, cheliceral length / clypeus height = 7.52, sternum length / width = 1.28, palpal coxa length / width = 2.35, femur I length / carapace width = 1.18, metatarsus I length / carapace width = 0.87, femur IV length / carapace width = 1.09, palpal tarsus length / carapace width = 0.46, palpal tarsus length / palpal patella length = 1.64, palpal tarsus length / palpal tibia length = 1.52, palpal tibia length / palpal patella length = 1.08. Cribellum divided (Fig. 34 C). Spination: palpus – femur d0-0-1, patella p1, tibia p2-1-0, r0-1-1-0, tarsus p2-0-1; leg I – femur d1-0-0-0, p0-0-0-2, tibia v2-2-2-2, metatarsus v2-2-3; leg II – femur d1-0-0-0, p1-0-0-2, tibia p0-0-1-0, v1-1-1-0, metatarsus v2-2-3; leg III – femur d1-1-0-1, p0-1-1-1, r1-0-1-1, tibia d0-0-1-0, p0-1-1-0, v1-2-2, r0-1-1-0, metatarsus p1-2-2, v0-0-0-2, r1-1-2; leg IV – femur d1-0-1-0, r0-0-0-1, tibia r0-1-1-0, metatarsus p0-1-2, v0-0-2, r1-2-2. Scopulae: strong ventral beneath all tarsi and beneath metatarsi I and II, beneath tibia I and apex of tibia II, and apices of metatarsi III and IV. Leg measurements: I:  $7.43 + 3.57 + 6.21 + 5.43 + 3.21 = 25.86$ ; II:  $6.36 + 3.21 + 5.21 + 4.86 + 3.00 = 22.64$ ; III:  $5.21 + \text{NA} + \text{NA} + 3.29 + 2.36 = \text{NA}$ ; IV:  $6.86 + 2.64 + 5.50 + 7.00 + 3.00 = 25.00$ ; palpus:  $3.29 + 1.79 + 1.93 + \text{NA} + 2.93 = 9.93$ . Leg formula 1423. **Female genitalia** (Figs. 33 B, C, 34 D, E): epigynal plate with median lobe surrounded by depressed atrium. Epigynal plate width 1.51 times length; atrium wide, width 1.15 times atrium length; epigynum length 1.18 times atrium length, atrium width 0.57 times epigynum width; atrium width at side of ML 1.30 times ML width; atrium and median lobe end near epigastric groove, atrium origin at 0.11 of epigynal plate length, median lobe broad, slightly wider at base, median lobe length 3.08 times width, ML ends just before atrium base, ML extends to apex of atrium, ML length 0.80 times epigynal length; lateral lobes very narrow, atrium width 6.66 times LL width; copulatory openings hidden beneath lateral sides of atrium, distance between CO 0.58 width of epigynal plate, CO distance from epigastric furrow 0.51 times epigynum length (Figs. 33 B, 34 D). Vulva with spermathecal ducts making three broad, transverse curves, vulva length 0.58 times width, vulva width 6.11 times distance between fertilization ducts (Figs. 33 C, 34 E).

**Variation.** Unknown: only the male paralectotype and female lectotype of *Marussenca madagascariensis* Dahl 1901 are known and intact.

**Material examined.** Only the *Uduba dahl* Simon 1903 lectotype female (ZMB25276a) and

*Uduba dahli* Simon 1903 paralectotype male (ZMB25277a), as well as fragments on slides, comprising the *Marussenca madagascariensis* syntype series from the Museum für Naturkunde, Berlin.

**Natural history.** Unknown. The female of *Uduba dahli* has a divided cribellum (Fig. 34 C), suggesting use of cribellate silk.

**Distribution.** Uncertain, but *Uduba dahli* are probably from southwestern Madagascar. The *Marussenca madagascariensis* syntype series specimens, including a mature male and female and other specimens that were dissected and mounted on slides, are probably from material collected by Dr. J. Braun, a traveler and botanist. In 1891 Braun was collecting plants in SW Madagascar near Andranohinaly and it is possible that the syntype series of specimens were collected there. Braun died in 1893. Some of the labels with the syntypes are labelled "Braun", some are labelled "Hildebrandt" and some have the name "Hildebrandt" whited out and replaced with "Braun." It seems likely that all were in fact collected by Braun and that "Hildebrandt" was a labelling error. The syntype series is likely from Andranohinaly, 23°17'21.80"S, 43°58'49.99"E, elev. 241m., which is about 30 km east of Toliara (Maps 2, 13). There are no other specimens of *Uduba dahli* known from other localities.

#### *Uduba danielae*, new species

Figures 5 A, B, 70 A, B, Maps 10, 20.

**Type material.** Holotype (CASENT9007875) and paratype females (CASENT9064777) collected from sifted litter in montane rainforest at 1620m elevation in Jardin Botanique at Réserve Spéciale d'Ambositantely, 18°10'17"S, 47°16'55"E, Antananarivo Province, Madagascar, collected 17-22 April 2001 by the Fisher-Griswold Arthropod Team, deposited in CAS. Paratypes, three additional females (CASENT9014779, CASENT9015002 and CASENT9014798), collected by raking tree trunks in montane rainforest at 1574m elevation in Jardin Botanique at Réserve Spéciale d'Ambositantely, 20 March 2003 by Daniela Andriamalala and Diana Silva, all deposited in CAS.

**Etymology.** The species epithet is an honor to Dr. Daniela Andriamalala, Malagasy arachnologist, expert on jumping spiders (Salticidae) and goblin spiders (Oonopidae), Lakeside International Scholar at CAS, member of the Fisher-Griswold Arthropod Team and collector of many new and interesting arthropods from Madagascar.

**Diagnosis.** *Uduba danielae* are members of group VI, the *Uduba danielae* group (Map 20). Females can be distinguished from those of other *Uduba* with a divided cribellum by the form of the female genitalia (Figs. 70 A, B). *Uduba danielae* is distinguished from *U. jayjay* by having the median lobe bell-shaped (Fig. 70 A), sides gently curved (*U. jayjay* with median lobe trapezoidal, lateral margins strongly convex), copulatory openings at anterior margin of obliquely transverse grooves, origin at 0.26 epigynum length (*U. jayjay* [Fig. 70 C] with copulatory openings beneath anterior margin of obliquely transverse grooves, origin at 0.48 epigynum length) and the vulva with spermathecal ducts (Fig. 70 B) beginning anteromedially and forming z-shaped path, lateral, medial, lateral, to posterior (*U. jayjay* [Fig. 70 F] with vulva with spermathecal ducts beginning anteromedially, forming gentle outside curve to vulva base, then entering at apex of BS bulb). Male unknown.

**Description.** **Male:** Unknown. **Female** (Holotype, CASENT9007875): Total length 6.60. Markings as in Figs. 5 A, B. Carapace 3.20 long, 2.30 wide, 1.10 high; clypeus 0.15 high. Eye diameters: AME 0.12, ALE, PME and PLE 0.16. Chelicerae 1.50 long; sternum 1.50 long, 1.25 wide; labium 0.75 long; palpal coxae 1.10 long. Cribellum divided. Spination: palpus—femur d0-1-2, patella p1-0, tibia p2-1, tarsus p0-1-1-0; leg I—femur d1-0-0, p0-0-2, tibia v1-1-2, metatarsus v2-



2-3; leg II—femur d1-1-0, p0-0-1, tibia v1-1-2, metatarsus v2-2-3; leg III—femur d1-1-0-1, p0-1-1-2; leg IV—femur p1-1-0, tibia v1-1-2, r0-1-1-0, metatarsus p0-2-2, v2-2-2, r1-2-2. Scopulae: ventral on tarsi I and II. Leg measurements: I:  $2.10 + 1.10 + 1.80 + 1.50 + 1.20 = 7.70$ ; II:  $1.90 + 1.00 + 1.40 + 1.30 + 1.10 = 6.70$ ; III:  $1.60 + 0.80 + 1.00 + 1.30 + 0.90 = 5.60$ ; IV:  $2.40 + 1.00 + 1.80 + 2.10 + 1.15 = 8.45$ ; palpus:  $1.00 + 0.55 + 0.60 + \text{NA} + 1.00 = 3.15$ . Leg formula 4123. **Female genitalia** (paratype, CASENT9014779): epigynal plate without depressed atrium, median and lateral lobes indistinct (Fig. 70 A), plate width 1.39 times length; width between bases of LL 0.47 times epigynum width; LL side width 0.25 epigynal plate width; median lobe bell-shaped, broader posteriorly, length 0.53 times epigynum length; copulatory openings at anterior margin of obliquely transverse grooves, origin at 0.26 epigynum length, distance between CO 0.47 times epigynum width. Vulva (Fig. 70 B) with spermathecal ducts beginning anteromedially and forming z-shaped path, vulva length 0.69 times width, fertilization ducts separated, vulva width 3.53 times distance between FD.

**Variation.** **Female** (N= 5): Total length 6.30–7.10. Ratios of carapace length / width = 1.39–1.767, carapace height / width = 0.48–0.68, PER / carapace width = 0.39–0.44, PER/OAL = 2.16–3.13, PER/AER = 1.05–1.34, OAL/OQL = 1.06–1.14, OQP/ OQA = 1.20–1.29, clypeus height / AME = 1.25–1.67, chelicera length / clypeus height = 8.67–13.00, sternum length / width = 1.07–1.36, palpal coxa length / width = 2.10–2.22, femur I length / carapace width = 0.87–1.05, metatarsus I length / carapace width = 0.64–0.76, femur IV length / carapace width = 0.96–1.10, palpal tarsus length / carapace width = 0.43–0.57, palpal tibia length / palpal patella length = 1.82–2.22, palpal tarsus length / palpal tibia length = 1.67–2.40, palpal tarsus length / palpal femur length = 1.00–1.11, palpal tibia length / palpal patella length = 0.83–1.22. **Male** variation unknown.

**Material examined.** MADAGASCAR: *Antananarivo Province*: Réserve Spéciale d'Ambohitantely, Forêt d'Ambohitantely, 24.1 km 59°NE d'Ankazobe, in Jardin Botanique, 18°10'17"S, 47°16'55"E, elev. 1620m, sifted litter in montane rainforest, 17–22 April 2001, Fisher-Griswold Arthropod Team (*Uduba danielae* Holotype, CASENT9007875 1♀, CAS, paratype, CASENT9064777, 1♀, CAS), Jardin Botanique at Réserve Spéciale d'Ambohitantely, ca. 20.9 km 72°NE Ankazobe, 18°13'30"S, 047°16'44"E, elev. 1574m, raking tree trunks, montane rainforest, 20 March 2003, D. Andriamalala and D. Silva [DSD0035] (paratype, CASENT9014779, 1♀, CAS), [DSD0039] (paratype, CASENT9015002, 1♀, CAS), [DSD0033] (paratype, CASENT9014798, 1♀, CAS).

**Natural history.** Specimens of the cribellate spider *Uduba danielae* were collected in leaf litter and on mossy tree trunks in montane rainforest. At least some individuals occur on vertical substrates.

**Distribution.** *Uduba danielae* are known only from the type locality in montane rainforest in central Antananarivo Province, Madagascar (Maps 10, 20).

### *Uduba evanescens* (Dahl, 1901)

Figures 2 D, 7 B, 8 C, 20 D, 29 A, 35 A–C, 36 A–F, 37 A–D, 38 A–I, 71 E, F, 80 G, Maps 7, 16.

*Calamistrula evanescens* Dahl, 1901a: 196, figs. 1–5. (type series, six slides and fragments of four individuals, from "South Central–Madagascar", in Museum für Naturkunde, Berlin, examined). Lectotype of *Calamistrula evanescens* Dahl 1901, *here designated*: the lectotype comprises the labelled fragments ZMB30812, ZMB30810\_part\_1, ZMB30810\_part\_2 and ZMB30811a. Lehtinen, 1967: 437, fig. 77. Lehtinen (1967) — p. 220: This is from the text on page 220: "*Calamistrula* F Dahl 1901, Sitz.-Ber. Ges. Naturf. Fr. Berlin 9, 186: *C. evanescens* Dahl 1901, *ibid.*, 195 f. 1 5 from Madagascar (female from Berlin). Described in Zoropsidae, transferred to Tenggellidae by F DAHL (1908: 194), and selected as the type genus for the subfamily Calamistrulinae by PETRUNKEVITCH (1928: 91). Listed here provisionally as

a deviating genus of Miturgidae: Uliodoninae. The name *Calamistrulinae* has priority over Uliodoninae, but it is not recommendable in this case. Lehtinen saw the Berlin types of *C. evanescens* Dahl 1901 and illustrated the vulva as his Fig. 77, p. 437.

*Uduba evanescens*, Polotow *et al.*, (2015: 151), **new combination** [urn:lsid:nmbe.ch:spidersp:023248] (Polotow *et al.* 2015: 151 — “*Calamistrula* Dahl 1901 is a junior synonym of *Uduba*.”

*Uduba sp.* CG8, Wheeler *et al.*, (2017: 586, fig. 6), DNA voucher, ARACG000008, CASENT9005888.

**Types.** The type series has been dissected: part is mounted on six different slides, there are two whole juveniles in alcohol and fragments of at least one additional individual, probably a mature female, in alcohol. The type series seems to represent at least four individuals, of which at least one is a mature female. The type series comprises “ZMB30808\_J” (Fig. 37 B)” (this is a whole juvenile in alcohol), “ZMB30811\_J” (Fig. 37 A) (this is a whole juvenile in alcohol), “ZMB30812” (Fig. 37 D) (this is a highly fragmented specimen in alcohol, which may be an adult, and the source of carapace and genitalia on the slide mounts), “ZMB30813\_J” (Fig. 37 C) (this is a highly fragmented specimen in alcohol, probably a juvenile), “ZMB30808a” (Fig. 38 B)” (four legs on a slide), “ZMB30809\_part1” (Fig. 38 A) (these are legs, palpi and endites on a slide), “ZMB30809\_part\_2” (Fig. 38 C) ( these are four legs on a slide), “ZMB30810\_part\_1” (this is the female, here designated lectotype, including carapace, endites, spinnerets on a slide) (Figs. 38 D–F) , “ZMB30810\_part\_2” (this is the female, including legs, endites, spinnerets on a slide) and “ZMB30811a” (Figs. 38 D–F)–(this is the female abdomen, including spinnerets and female genitalia, on a slide). We hereby designate the mature female as the lectotype of *Calamistrula evanescens* Dahl 1901a. The lectotype comprises the labelled fragments ZMB30812, ZMB30810\_part\_1, ZMB30810\_part\_2 and ZMB30811a.

**Identification.** Dahl’s German language description (Dahl 1901a: 196) reveals much about his concept of the species. He remarks that the cribellum is highly reduced in this species, which corresponds to the ecribellate specimens in the syntype series and that are included in the species concept adopted here. Dahl (1901a: 181) states “Die mir vorliegende neue Form, welche ich *Calamistrula evanescens* n. g. n. sp. nenne, unterscheidet sich von den meisten bis jetzt bekannt gewordenen Arten der Familie durch eine starke Reduction sowohl des Calamistimis als auch des Cribellums” (OUR TRANSLATION: The new form lying before me, which I call *Calamistrula evanescens* n. g., n. sp...., differs from most of the species of the family known so far by a strong reduction in both calamistrum and cribellum). “An Stelle des Calamisti’ums findet man lediglich eine Gruppe stärkeerer Haare die nicht durch eine regelmässige Haarreihe begrenzt wird.” (OUR TRANSLATION: Instead of the calamistrum, there is only a group of thicker hairs that is not limited by a regular row of hair.) “Die Zahl der Haare steigt bei unreifen Tieren bis auf etwa 50” (OUR TRANSLATION: The number of hairs in immature animals increases to around 50). Da aber ähnliche Haare auch sonst am Metatarsus vorkommen, fällt die Gruppe wenig ins Auge. Ich hoffe, dass die Fig. 1 der etwas rohen Zinkographien, deren Umrisse mit der Camera von *Calamistrula*. gezeichnet sind, die Verhältnisse veranschaulichen wii’d”. (OUR TRANSLATION: However, since similar hairs also occur on the metatarsus, the group is hardly noticeable. I hope that Fig. 1 [sic] of the somewhat crude zincographs, the outlines of which with the camera of *Calamistrula* are drawn, the circumstances illustrated). “Nach der letzten Häutimg des mir allein bekannten Weibchens tritt, wie es scheint, die Zahl der Haare noch weit mehr zurück. Nur etwa 10 dieser stärkeren Haare bleiben erhalten imd die Grenzen des Feldes verwischen sich völlig iias Cribellim dieser Species (Fig. 2) ist breit di’eieckig, am Ende gerundet, kalil und, wie mir scheint, völlig frei von Spinnspulen.” (OUR TRANSLATION: After the last skinning [i.e., the final molt] of the only female I know, the number of hairs, it seems, decreases even more. Only about 10 of these thicker hairs are retained and the boundaries of the field are blurred ... completely. The

cribellum of this species (Fig. 2) is broadly di'angular, rounded at the end, ... and, it seems to me, completely free of spinning bobbins).

**Remarks.** Dahl (1901a: 196) states that there is only one mature female, which is here designated as the lectotype of *Calamistrula evanescens* Dahl 1901a.

**Diagnosis.** *Uduba evanescens* are members of Group II, the Epigynum lateral projection group, or *Uduba evanescens* group (Map 16). Males can be distinguished from those of other *Uduba* spp. except *U. pseudoevanescens* and *U. rakotofrah* in that the palp has a notched MA and a pointed TA2 that extends far apicad even of TA1 (Figs. 29 A, 35 A–C, 36 A–F) but differs from *U. rakotofrah* in that the TA3 and conductor extend apicad of all processes (in *U. rakotofrah* the TA2 extends far apicad [Figs. 29 B, 57 B]), TA3 is large and swollen (small and hidden in *U. rakotofrah*) and the basal lobe of the MA is entire (Fig. 29 A) with a concave margin (deeply forked in *U. rakotofrah* [Fig. 29 B]). The females of *Uduba evanescens* have the epigynum of the typical “*Calamistrula*” type with large, ear-like lobes extending laterally of the median sector (Fig. 71 E). The lateral lobes are laterally rounded and larger than those on the epigyna of species *U. volana* (Fig. 77 E) and *U. goodmani* (Fig. 77 A). The genitalia of *U. evanescens* (Figs. 71 E, F) and *U. pseudoevanescens* (Figs. 71 A, B) are nearly identical and not diagnostic, but *U. evanescens* is ecibellate (Fig. 20 D) and *U. pseudoevanescens* has a divided cribellum (Fig. 20 C) or a vestige in the adult male.

**Description. Male** (CASENT9006087, Ranomafana): Total length 9.90. Markings as in Fig. 8 C. Carapace 5.50 long, 3.90 wide, 1.20 high; clypeus 0.30 high. Eye diameters: AME and ALE 0.26, PME 0.24, PLE 0.28. Chelicerae 2.40 long; sternum 2.40 long, 1.80 wide; labium 1.10 long; palpal coxae 1.70 long. With a colulus. Spination: palpus–femur d1-1-1, patella p1-0; leg I–femur d0-1-1-2, p0-1-2, r0-1-0, patella p1, tibia d0-1-1-0, p0-1-1-0, v2-2-2-2, r0-1-1-0, metatarsus p1-1-0, v2-2-2, r1-1-0; leg II–femur d0-1-1-1, p0-1-2, r0-1-1-0, patella p1, tibia d0-1-1-0, p0-1-1-0, v2-2-2-2, r0-1-1-0, metatarsus p1-2-1, v2-1-2, r1-0-1; leg III–femur d1-0-1-1, p0-0-1, r0-0-1, tibia d0-1-0, p0-1-1-0, v2-2-2, r0-1-1-0, metatarsus p1-2-1, v2-1-2-1, r1-1-1; leg IV–femur d1-1-3, tibia d0-0-1-0, p0-1-1-0, v2-2-2, r1-0-0, metatarsus p1-2-2, v2-2-2, r1-1-2. Scopulae: cymbium, apicodorsal (Figs. 32 A, C); tarsi and apical metatarsi I–IV, ventral. Leg measurements: I:  $6.50 + 2.20 + 6.70 + 6.60 + 3.60 = 25.60$ ; II:  $5.80 + 2.00 + 5.60 + 5.70 + 2.80 = 21.90$ ; III:  $4.80 + 1.70 + 3.50 + 4.50 + 2.20 = 16.70$ ; IV:  $6.10 + 1.90 + 5.60 + 6.50 + 2.80 = 22.90$ ; palpus:  $1.90 + 0.70 + 0.80 + \text{NA} + 2.30 = 5.70$ . Leg formula 1423. **Male palp:** palpal tibia 0.41 times cymbial length, RTA triangular, length 0.35 tibia length, length 1.56 times width, with sharply-pointed apex (Figs. 35 A–C); VTA long, cylindrical, upturned, length 1.89 times width, length 0.47 times tibia width; tibia lacking stout spines; tegulum convex, with retroapical indentation, without ridge, tegulum length 1.06 times width; TA1 extends to tegulum apex, TA2 and TA3 extend beyond TA1 and tegulum apex, TA3 a convex, blunt lobe, TA2 a large, pointed triangle, extending farthest apicad of all tegular processes (Figs. 29 A, 36 B, C); MA complex, with proximal blunt lobe, median notch, and apical curved lobe (Figs. 36 E, F), origin at 0.13 times tegulum length, tegulum apex at 0.37 tegulum length from MA apex, length (including apical processes) 1.21 times width, MA large, length 0.54 times tegulum length, width 0.47 tegulum width; tegulum with apical mound that partially covers base of TA3; conductor fan concave (Figs. 36 A–F). **Female** (Ranomafana, CASENT9006086): Total length 15.71. Markings as in Fig. 7 B. Carapace 8.29 long, 5.57 wide, 3.57 high; clypeus 0.50 high. Eye diameters: AME 0.43, ALE 0.41, PME 0.38, PLE 0.41. Chelicerae 4.14 long; sternum 3.79 long, 2.75 wide; labium 1.79 long; palpal coxae 2.68 long. With a colulus (Fig. 20 D). Spination: palpus–femur d0-1-2, patella p1-0, tibia p2-0, tarsus p2-1-0; leg I–femur d1-0-1-0, p0-0-0-2, tibia v2-2-2-2, metatarsus v2-2-3; leg II–femur d1-0-0-1, p0-0-0-1, tibia p0-0-1-0, v1-2-1-2, metatarsus v2-2-3; leg III–femur d1-0-0-1, p1-0-0-1-1, r0-1-1-0, tibia d0-1-0-0, p1-0-1-0, v2-1-2,

r1-0-1-0, metatarsus p1-2-2, v2-2-2, r1-1-2; leg IV—femur d1-0-0, tibia v1-1-2, r0-1-1-0, metatarsus p0-0-1-2, v1-1-2, r0-0-1-2. Scopulae: ventral on tibia—tarsus I, metatarsus—tarsus II and II, apical metatarsus—tarsus IV. Leg measurements: I:  $6.43 + 3.21 + 5.21 + 4.71 + 2.43 = 22.00$ ; II:  $5.57 + 2.86 + 4.43 + 4.29 + 2.14 = 19.29$ ; III:  $4.57 + 2.36 + 2.86 + 3.50 + 1.57 = 14.86$ ; IV:  $5.93 + 2.57 + 4.93 + 5.29 + 1.86 = 20.57$ ; palpus:  $2.86 + 1.57 + 1.71 + \text{NA} + 2.43 = 8.57$ . Leg formula 1423. **Female genitalia** (CASENT9024032) (Figs. 71 E, F): epigynal plate without depressed atrium, lateral lobes extending to sides forming earlike lobes, plate width 2.04 times length; width between bases of LL 0.65 times epigynum width; lateral ears wide, arising far from epigastric furrow (Fig. 72 E), (LL side) width 0.18 times width epigynum, lateral ears (LL side) width 0.89 times LL side length; median lobe a flat plate with longitudinal, laterally bulging convex median hoods, with copulatory openings beneath these hoods, distance between copulatory openings 0.37 times epigynum width, CO origin at 0.31 of epigynum length. Vulva (Fig. 71 F) with spermathecal ducts forming three loose, irregular longitudinal loops, vulva length 0.625 times width, fertilization ducts well separated, vulva width 8.00 times distance between FD (Fig. 80 G).

**Variation.** **Male** (N= 8): Total length 7.40–12.00; carapace length / width = 1.39–1.53, carapace height / width = 0.31–0.61, PER / carapace width = 0.38–0.47, PER / OAL = 2.38–2.69, PER / AER = 1.10–1.31, OAL / OQL = 1.13–1.24, OQP / OQA = 1.04–1.09, clypeus height / AME = 1.11–1.67, cheliceral length / clypeus height = 6.67–9.00, sternum length / width = 1.24–1.43, palpal coxa length / width = 1.62–3.00, femur I length / carapace width = 1.33–1.71, metatarsus I length / carapace width = 1.42–1.71, femur IV length / carapace width = 1.39–1.59, cymbium length / carapace width = 0.59–0.70, cymbium length / palpal patella length = 2.63–3.29, cymbium length / palpal tibia length = 2.10–2.88, cymbium length / palpal femur length = 1.00–1.21, palpal tibia length / palpal patella length = 1.13–1.25. **Female** (N= 6): Total length 11.50–21.00 (most are less than 15.71, but there is a very large individual from Montagne d'Anjanaharibe, CASENT9017839, that is 21.00 long); carapace length / width = 1.38–1.58, carapace height / width = 0.58–0.75, PER / carapace width = 0.46–0.83, PER / OAL = 2.71–3.32, PER / AER = 1.26–1.38, OAL / OQL = 1.00–1.25, OQP / OQA = 0.98–1.15, clypeus height / AME = 1.00–1.67, cheliceral length / clypeus height = 6.88–10.40, sternum length / width = 1.20–1.38, palpal coxa length / width = 1.79–2.42, femur I length / carapace width = 1.08–1.16, metatarsus I length / carapace width = 0.74–0.95, femur IV length / carapace width = 1.00–1.12, palpal tarsus length / carapace width = 0.38–0.48, palpal tibia length / palpal patella length = 1.40–2.00, palpal tarsus length / palpal tibia length = 1.40–1.67, palpal tarsus length / palpal femur length = 0.72–1.04, palpal tibia length / palpal patella length = 1.00–1.22. Genitalia as in (Figs. 71 E, F, 80 G).

**Material examined.** MADAGASCAR: *No province specified*: *Calamistrula evanescens* Dahl, 1901a: 196, f. 1-5 (type series, six slides and fragments of four individuals, from "South Central-Madagascar", in Museum für Naturkunde, Berlin, lectotype of *Calamistrula evanescens* Dahl 1901, the lectotype comprises the labelled fragments ZMB30812, ZMB30810\_part\_1, ZMB30810\_part\_2 and ZMB30811a. "Madagascar C.", F. Ambohimaso (bois mort), July 1948, J. Millot, (CASENT9006083, 1♀, MNHN). *Antananarivo Province*: Res Spec. d'Ambohitantly, Forêt d'Ambohitantly, forest fragment, ca. 20 km NE d'Ankazobe, 18°12'29.6"S, 047°17'6.3"E, elev. 1638m, montane rainforest, "LDD" fallen logs/ litter, 20 March 2003, D. Silva, D. Andriamalala [DSD0064] (CASENT9015691, 2♂, 2♀, 13jj, CAS); R. S. d'Ambohitantly, Forêt d'Ambohitantly, Jardin Botanique, 24.1 km 59°NE Ankazobe, 18°10'17"S, 47°16'55"E, elev. 1620m, montane rainforest, general collecting, fallen logs/litter, [AToL DNA voucher ARACG000008; Wheeler et al. 2017 voucher Uduba-CG8], 19–21 March 2003, D. Andriamalala, D. Silva, et. al. [DSD0034] (CASENT9005888, 1♂, 1♀, 1jj, CAS); Analamanga Region, District of Ankazobe, Ambohitantly, 46Km NE of Ankazobe, 18°11.88'S, 47°16.89'E, elev. 701m, Forêt sclerophylle,

malaise, 3–17 April 2005, M. Irwin and R. Harin'Hala [MG-27-32] (CASENT9056332, 1♂, CAS). *Fianarantsoa Province*: Fitovavy, Fitovinany Region, District of Ifanadiana, 12Km W of Ranomafana, Radio Tower, 21°15.05'S, 047°24.43'E, elev. 1127m, malaise, canopy trap in open area at forest edge, R. Harin'Hala and M. Irwin, 22–31 March 2009, [MG-09B-243] (CASENT9053028, 1♂, CAS), 31 January–4 February 2009 [MG-09B-198] (CASENT9042996, 1♂, CAS), elev. 1130m, malaise, mixed tropical forest, M. Irwin, R. Harin'Hala, 23–30 October 2005 [MA-02-09B-127] (CASENT9032856, 2♂, CAS), 11–18 November 2006 [MA-02-09B-164] (CASENT9042521, 1♂, CAS), 11–18 November 2006 [MA-02-09B-164] (CASENT9042521, 1♂, CAS), 23–30 October 2005 [MA-02-09B-127] (CASENT9032856, 2♂, CAS), 27 February–9 March 2003 [MA-02-09B-54] (CASENT9030917, 1♂, CAS), 8–22 July 2004 [MA-09b-96] (CASENT9062701, 1♀, CAS); Parc National Ranomafana, BelleVue at Talatakely, elev. 1020m, 21°15.99'S, 47°25.21'E, malaise, secondary tropical forest, 28 May–6 June 2003, M. Irwin and R. Harin'Hala [MA-02-09C-62] (CASENT9030931, 1♂, CAS), 15–28 May 2003, M. Irwin and R. Harin'Hala [MA-02-09C-61] (CASENT9030902, 1♂, CAS); Parc National Ranomafana, Talatakely, Research cabin, 21°14.9'S, 47°25.6'E, 9–30 April 1998, C. Griswold, D. Kavanaugh, N. Penny, D. Ubick, M. Raheirilalao, J. Schweikert and S. Ranorainarisoa (CASENT9006087, 1♂, CAS), from "burrow on Trial F", [*Dong Lin photos of burrows, this publication, Fig. 2D*]; 17 April 1998, C. Griswold (CASENT9006088, 1♀, CAS); Parc National Ranomafana, Talatakely, 21°14.9'S, 47°25.6'E, walking on tree trunk near stream, 26 April 1998, C. Griswold, (CASENT9006089, 1♀, CAS); Talatakely forest, 42.3 km 58° NE Fianarantsoa, 21°15'28.0"S, 47°25'21.8"E, elev. 1050m, montane rainforest, general collecting, 24 December 2005 to 14 January 2006, H. Wood, J. Miller, J. J. Rafanomezantsoa, E. Rajeriarison, V. Andriamananon, [HW009] (CASENT9024032, 1♀, CAS); Ranomafana National Park, 2.3 km N of Vohiparara village, collected on road cut at night, elev. 1100m, 21°12'58"S, 47°22'59"E, 10 April 1998, D. Kavanaugh (CASENT9006090, 1♀, CAS), 10 April 1998, C. Griswold, D. Kavanaugh, N. Penny, D. Ubick, M. Raheirilalao, J., Schweikert and S. Ranorainarisoa (CASENT9006091, 1♀, CAS); Vohiparara, Sahamalaoatra forest, 41.1 km 54°NE Fianarantsoa, 21°14'19.9"S, 47°23'39.2"E, elev. 1200m, montane rainforest, general day collecting, [*DNA voucher Mad-059*], 26 December 2005–14 January 2006, H. Wood, J. Miller, J.J. Rafanomezantsoa, E. Rajeriarison, and V. Andriamananony (CASENT9024011, 1♀, CAS); Ranomafana N. P., by river, in burrow in moss on rocky cliff, 24 March 1992, V. and B. Roth, Kariko/Roth Voucher Collection, (CASENT9006085, 1♀, MCZ); Ranomafana, ca. 21°12'S; 47°27'E, 19–20 March–April 1992, V. and B. Roth (CASENT9006086, 1♀, CAS); extreme northern limit of R.S. de Ivohibe, along Hefitany River, ca. 7.5 km ENE Ivohibe, camp #4, 22°28.2'S, 46°57.6'E, elev. 1200m, mid elevation forest, partially disturbed by cyclone, pitfall traps #10–12, 3–9 September 1997, S. Goodman [SG1997-04] (CASENT9006102, 1♀, FMNH). *Toamasina Province*: Montagne d'Anjanaharibe, 19.5 km 27°NNE Ambinanitelo, 15°10'42"S, 49°38'6"E, elev. 100m, montane rainforest, general collecting day spiders, 12–16 March 2003, Fisher-Griswold Arthropod Team [BLF8156] (CASENT9017839, 1♀, CAS).

**Natural history.** Collection records for *Uduba evanescens* are from lowland to montane forest, including disturbed and intact forest, and even in sclerophyll forest, i.e., Ambohitantely, 46Km NE of Ankazobe, elev. 701m, "Forêt sclerophylle", CASENT9056332. Individuals have been found walking on the ground at night or walking on vegetation. At least some males will climb into the forest canopy, as revealed by a collection from a canopy trap at Ranomafana. Individuals of this ecribellate species may also construct burrows: at Ranomafana in southeast Madagascar individuals have been taken from terrestrial tubes and burrows (Fig. 2 D, ♀, CASENT9006088).

**Distribution.** Most specimens of *Uduba evanescens* were collected in the eastern forests of central to southern Madagascar (Maps 7, 16). A northern specimen from north of Antongil Bay



(CASENT9017839) is much larger than typical *U. evanescens* (21mm compared to 15mm or less) but has other no obvious differences from those in central east Madagascar, hence identification as *U. evanescens*. There is one case of sympatry with the closely-related species *U. pseudoevanescens* at Ranomafana (Map 16): females of *U. pseudoevanescens* have been collected there on 5 March and 19-20 July 1992, whereas males and females of *U. evanescens* have been collected in the Ranomafana area virtually throughout the year. The absence of collections *U. evanescens* at Ranomafana in August and September seems only to be an artifact of fieldwork.

### *Uduba fandroana*, new species

Figures 9 F, 39 A–C, Maps 12, 13.

**Type material.** Holotype male (CASENT9002691) from montane rainforest at 1300m elevation at 11.5 km 147°SSE Anjozorobe, (18°28'24"S, 47°57'36"E), Antananarivo Province, Madagascar, collected 5–13 December 2000 by the Fisher-Griswold Arthropod Team (BLF2370), deposited in the CAS. Paratype male (CASENT9064784), same data, deposited in CAS.

**Etymology.** The species epithet, *fandroana*, refers to an annual New Year's festival in Madagascar, a noun in apposition.

**Diagnosis.** *Uduba fandroana* are members of Group I.a, the *Uduba dahli* group (Map 13) of Group I, the Epigynal atrium group. They are ecibellate, with a colulus. Males have the palpus (Figs. 39 A–C) with the MA relatively small, width less than 0.35 tegulum width, height less than 0.25 tegulum height, without prominent projections, TA2 small, inconspicuous, TA2 a small, slender, sharp blade, pointing distally and hidden behind TA3, TA3 large, strongly curved (Figs. 39 A–C); males of *Uduba fandroana* are distinguished from *U. lamba* by the small, simple MA (*U. lamba* have the MA large, concave in center with strong marginal ridge [Fig. 49 A–C]); males of *U. fandroana* are distinguished from *U. hainteny* by the small, inconspicuous TA2 (*U. hainteny* have the TA2 large, conspicuous and with the apex a rounded blade, TA2 equal to or larger than TA3 [Figs. 42 A–C]). Female unknown.

**Description.** Male (Holotype): Total length 10.20. Markings as in Fig. 9 F. Carapace 5.80 long, 3.80 wide, 2.00 high; clypeus 0.20 high. Eye diameters: AME and ALE 0.22, PME 0.20, PLE 0.26. Chelicerae 2.50 long; sternum 2.50 long, 2.00 wide; labium 1.20 long; palpal coxae 1.90 long. With a colulus. Spination (paratype, CASENT9064784), palpus–femur d1-1-1, p0-0-1, r0-0-1, patella p0-1, tibia p1-0; leg I–femur d1-1-1, p0-1-2, r0-1-0-1, tibia d0-1-1-0, p0-1-1-0, v2-2-2-2, r0-1-1-0, metatarsus p1-1-0, v2-2-3, r1-1-0; leg II–femur d1-0-1-1, p1-0-2, r1-1-0-1, tibia d0-1-1-0, p0-1-1-0, v2-2-2-2, r0-1-1-0, metatarsus p1-1-0, v2-2-3, r1-1-0; leg III–femur d1-1-1, p1-1-1-1, r0-1-1-1, tibia d0-1-0, p0-1-1-0, v2-2-2, r0-1-1-0, metatarsus p1-1-2, v2-2-2, r1-1-2, tarsus v0-1-0; leg IV–femur d1-1-1, p1-1-1-1, r0-0-1-1, patella r1, tibia d0-1-0, p0-1-1-0, v2-2-2, r10-0-1, metatarsus d1-1-1-0, p1-1-1-1, v2-2-2, r1-0-01. Scopulae: cymbium, apicodorsal; strong beneath all tarsi, half of metatarsus I and apices of metatarsi II–IV. Leg measurements (holotype): I:  $5.70 + 2.20 + 5.90 + 6.50 + 3.50 = 23.80$ ; II:  $5.30 + 2.00 + 5.00 + 5.50 + 3.10 = 20.90$ ; III:  $4.40 + 1.70 + 3.40 + 4.70 + 2.50 = 16.70$ ; IV:  $6.00 + 1.90 + 5.80 + 7.50 + 3.40 = 24.60$ ; palpus:  $1.90 + 0.80 + 0.90 + \text{NA} + 2.80 = 6.40$ . Leg formula 4123. **Male palp** (holotype): palpal tibia 0.38 times cymbial length, RTA a broad blade, slightly curved ventrad, RTA length 0.32 times tibia, 1.20 times width, with pointed apex (Figs. 39 A–C); VTA conical, VTA length 1.44 times width, length 0.35 times tibia width; tibia lacking stout spines; tegulum convex, without ridge, tegulum length 1.02 times width; TA1 extends distad of tegulum apex, TA1 extends past TA3 apex by 1.18 times tegulum length; TA3 a broad, sharp-pointed screw with proximal ridges, extends apicad of TA2 by 1.17 tegulum length, TA2 a small, slender, sharp blade, pointing distally and hidden behind TA3 (Fig. 39 A); MA simple, origin at 0.35 times tegulum length, tegulum apex at 0.31 tegulum length

from MA apex, length (including apical processes) 0.53 times width, MA small (Fig. 39 B), length 0.17 tegulum length, width 0.32 tegulum width; conductor fan entire. **Female.** Unknown.

**Variation.** (N = 4): Total length = 9.10–11.50, carapace length / width = 1.40–1.55, carapace height / width = 0.49–0.58, PER / carapace width = 0.38–0.41, PER / OAL = 2.61–3.00, PER / AER = 1.30–1.34, OAL / OQL = 1.00–1.20, OQP / OQA 1.09–1.20, clypeus height / AME = 0.91–1.67, cheliceral length / clypeus height = 7.75–12.50, sternum length / width = 1.21–1.33, palpal coxa length / width = 2.56–2.71, femur I length / carapace width = 1.28–1.55, metatarsus I length / carapace width = 1.38–1.71, femur IV length / carapace width = 1.34–1.58, cymbium length / carapace width = 0.65–0.74, cymbium length / palpal patella length = 3.13–3.50, cymbium length / palpal tibia length = 2.60–3.11, cymbium length / palpal femur length = 1.13–1.47, palpal tibia length / palpal patella length = 1.09–1.25. Only males known, female variation unknown.

**Material examined.** MADAGASCAR: *Antananarivo Province*: 3 km 41°NE Andranomay, 11.5 km 147°SSE Anjozorobe, 18°28'24"S, 47°57'36"E, elev. 1300m, pitfalls in montane rainforest, 5–13 December 2000, Fisher, Griswold *et al.*, [BLF2370] (Holotype, CASENT9002691, 1♂, CAS), (paratype, CASENT9064784, 1♂, CAS), Réserve Spéciale d'Ambohitantely, 24 km NE Ankazobe, 18°10.1'S, 47°16.6'E, elev. 1450m, disturbed transitional montane mossy forest, pitfall traps 7–8, 7–12 December 1997, S. Goodman (CASENT9006223 1♂, FMNH). *Fianarantsoa Province*: Fitovinany Region, District of Ifanadiana, 12 km W of Ranomafana, Radio Tower, 21°15.05'S, 047°24.43'E, elev. 1127m, malaise, canopy trap in open area at forest edge, 10–15 November 2009, Harin'Hala Rinha and M. Irwin [MG-09B-267] (CASENT9017919, 1♂, CAS); Forêt d'Ankazomivady, 4.7 km SW Ambalamanakana, 28 km SSW Ambositra, 20°46.5'S, 47°10.1'E, elev. 1670m, pitfall traps #1–3, disturbed upper montane forest, 7–14 January 1998, S. Goodman (CASENT9006103, 3♂, FMNH); RNI Andringitra, Anjavidilay, 8.5 km SE Atanifotsy, 22°09.5'S, 46°57.6'E, elev. 1990m, pitfall trap in *Philippia*-dominated sclerophyllus forest, 5–11 March 1998, S. Goodman (CASENT9064649, 2♂, FMNH); Korikory, SE of Fandriana, 20°23'4"S, 47°40'2"E, elev. 1670m, 13 March 2000, E. Schlinger (CASENT9006000, 1♂, CAS).

**Natural history.** Records of *Uduba fandroana* are all from over 1000m elevation, in the vicinity of montane rainforest, from forest margins and from *Philippia*-dominated sclerophyllus forest. Nothing is known of silk use by this ecribellate species.

**Distribution.** Specimens of *Uduba fandroana* have been collected in upland eastern forest from central to central-south Madagascar (Maps 12, 13).

### *Uduba fisheri*, new species

Figures 4 A–H, 12 E, 14 F, H, 15 A–G, 18 C–F, 19 A, C, 25 A, C, 28 C, 29 H, 40 A–C, 41 A–F, 72 E, F, 81 A, D, Maps 9, 17.

"*Uduba sp. Anjozorobe*", Griswold *et al.* (2005: 254, fig. 153 O).

**Type material.** Holotype male (CASENT9025464) and male and female paratypes (CASENT9026388) from pitfall traps set out between 5–13 December 2000 at 1300m elevation in montane rainforest located at 3 km 41°NE Andranomay, 11.5 km 147°SSE Anjozorobe, 18°28'24"S, 47°57'36"E, in Antananarivo Province, Madagascar, collected by the Fisher-Griswold Arthropod Team (BLF2370), deposited in CAS.

**Etymology.** The species epithet is a patronym in honor of Brian Lee Fisher, Patterson Scholar of Science and Sustainability at the California Academy of Sciences, an inspirational collector and naturalist responsible for many of our data on Madagascar arthropods, an organizer of Madagascar biodiversity surveys, a taxonomic expert on ants, and, through his efforts like *Antveb*, a pioneering visionary in providing taxonomic and biodiversity data to a worldwide audience.

**Diagnosis.** *Uduba fisheri* are members of Group III, the *Uduba valiha* group (Map 17). They

are among the smallest of all *Uduba*, with the maximum length of males 6.00, of females 10.50. *Uduba fisheri* have a divided cribellum or a vestige of such in the male (Fig. 25 A). Males of *Uduba fisheri* have a stout propine on the palpal tibia but lack a blunt retrospine, and can be distinguished from those of other *Uduba* by the thick, blunt VTA, the short, curved RTA, an MA with a deep central concavity and apically a blunt lobe and basally a narrow, nearly cylindrical projection (Figs. 40 A–C, 41 D, F); middle of MA is partly hidden behind a tegular projection (Fig. 28 C); the trapezoidal TA2 of *U. fisheri* (Fig. 28 C) differs from the triangular TA2 of *U. hiragasy* (Fig. 28 A) and the recurved TA2 of *U. valiha* (Fig. 28 B). Females of *Uduba fisheri* (Figs. 72 E, F) have a median lobe with slightly raised longitudinal ridge (Fig. 81 A), copulatory openings at mid-level of plate at 0.50 of epigynum length with medial and lateral lobes united, copulatory openings exposed laterally in concavities, these openings located more anterior than in *Uduba valiha* (Figs. 64 A–C) and *Uduba hiragasy* (Figs. 44 A–C), with a strong edge along epigastric furrow (Fig. 81 A).

**Description. Male** (Holotype, CASENT9025464): Total length 6.00. Markings as in Figs. 4 C, E, F, H. Carapace 3.20 long, 2.20 wide, 1.40 high; clypeus 0.10 high. Eye diameters: AME 0.05, ALE 0.12, PME 0.13, PLE 0.14. Chelicerae 1.40 long; sternum 1.50 long, 1.20 wide; labium 0.60 long; palpal coxae 1.05 long. Cribellum divided (Fig. 25 A). Spination (CASENT9026388): palpus–femur d1-1-1; leg I–femur d0-1-1-0, p0-0-2, tibia p0-0-0-1, v2-2-2-2, metatarsus p0-0-0-1, v2-2-2-2; leg II–femur d1-1-1, tibia p0-0-0-1, v1-1-1-2, metatarsus p0-1-1, v2-2-2; leg III–femur d1-1-1, p1-0-1-1, r0-1-1-0, tibia d0-0-1-0, p0-1-1-0, v2-2-2, r0-1-1-0, metatarsus d0-1-0, p2-1-2, v2-2-2, r1-1-2; leg IV–femur d0-1-1-0, p0-0-1, r0-0-1, tibia d0-0-1-0, p0-1-1-0, v2-2-2, r0-1-1-0, metatarsus p1-2-2, v2-1-1-2-2, r1-2-2. Scopulae: cymbium, apicodorsal (Fig. 41 A); weak beneath leg tarsi and metatarsi. Leg measurements: I:  $2.70 + 1.20 + 2.40 + 2.10 + 1.60 = 10.00$ ; II:  $2.30 + 1.10 + 1.90 + 1.80 + 1.50 = 8.60$ ; III:  $2.10 + 0.90 + 1.40 + 1.30 + 1.10 = 6.80$ ; IV:  $2.70 + 1.10 + 2.40 + 2.80 + 1.70 = 10.70$ ; palpus:  $1.20 + 0.50 + 0.50 + \text{NA} + 1.20 = 3.40$ . Leg formula 4123. **Male palp** (CASENT9065669): palpal tibia 0.43 cymbial length, RTA a broad, blunt curved blade (Fig. 40 C), length 0.17 times tibia length, RTA length 0.60 times width, apex with a sharp curve to ventrad (Figs. 29 H, 40 A–C, 41 A–F), VTA large, length 2.00 times width, elongate cylindrical with blunt apex (Figs. 40 C, 41 C, F), length 0.17 tibia width; tibia lacks stout retrolateral spine but with a prolateral spine (Fig. 40 B); tegulum with longitudinal, retroapical ridge (Figs. 41 B, E), extending for 0.60 tegulum length, tegulum length 1.15 times width; TA1 extends distad of tegulum apex, TA1 extends past TA3 apex by 1.23 times tegulum length; TA3 transverse extending into blunt apex hidden behind TA2, TA2 extends apicad of TA3, TA2 erect, trapezoidal, tegulum with small bump near TA2 base (Fig. 28 C); MA subdistal on tegulum, origin at 0.38 times tegulum length, tegulum apex at 0.29 tegulum length from MA apex, length (including apical processes) 1.74 times width, MA length 0.31 times tegulum length, width 0.49 times tegulum width, MA complex with basal erect narrow lobe and apical knoblike projection (Figs. 41 D, E); conductor fan convex (Fig. 40 C). **Female** (paratype, CASENT9026388): Total length 10.50. Markings as in Figs. 4 A, B, D, G. Carapace 5.00 long, 3.40 wide, 1.70 high; clypeus 0.30 high. Eye diameters: AME 0.20, ALE 0.22, PME 0.20, PLE 0.24. Chelicerae 2.60 long; sternum 2.10 long, 1.70 wide; labium 1.10 long; palpal coxae 1.70 long. Divided cribellum. Spination (CASENT9026388): palpus–femur d0-0-1, patella p1-0, tibia p2-1, r1-0, tarsus p0-1-1-0, v0-0-2; leg I–femur d1-0-0, p0-0-1, tibia v2-2-2-0, metatarsus p0-0-1, v2-2-2; leg II–femur d1-0-0, p0-0-1, tibia d1-0-1, v1-1-1 (retroventral), metatarsus p0-0-1, v2-2-2; leg III–femur d1-0-0, p0-1-0, r0-1-0, tibia d0-1-0, p0-1-1-0, v2-1-1, r0-0-1-0, metatarsus p1-1-1, v2-2-2, r1-1-1; leg IV–femur d1-0-1, tibia v1-2-2, r0-1-1-0, metatarsus d0-1-0-0, p0-1-0-2, v2-1-2-2, r1-1-2. Scopulae: ventral on tarsi I and II. Leg measurements: I:  $3.40 + 1.60 + 3.00 + 2.70 + 1.90 = 12.60$ ; II:  $3.10 + 1.50 + 2.50 + 2.40 + 1.60 = 11.10$ ;

III:  $2.80 + 1.30 + 1.70 + 2.10 + 1.50 = 9.40$ ; IV:  $3.70 + 1.50 + 3.10 + 3.70 + 1.80 = 13.80$ ; palpus:  $1.60 + 0.80 + 1.00 + \text{NA} + 1.60 = 5.00$ . Leg formula 4123. **Female genitalia** (CASENT9026389, Anjozorobe): epigynal plate without depressed atrium (Figs. 72 E, F), plate lateral margins sclerotized, weakly convex, posterior margin strongly marked (Fig. 81 A), width 1.43 times length, lateral lobes with weak ridges forming oval depressions on each side, width between bases of LL 0.57 times epigynum width, LL side width 0.16 times width epigynum; ML with slightly raised longitudinal ridge, copulatory openings at mid-level of plate at 0.50 of epigynum length (Fig. 81 A), distance between copulatory openings 0.49 times epigynum width. Vulva (Figs. 72 F, 81 D), with spermathecal ducts forming 2-3 loose, longitudinal loops, vulva length 0.84 times width, fertilization ducts widely separated, vulva width only 2.67 times distance between FD.

**Variation. Male** (N= 5): Total length 5.10–6.00; carapace length / width = 1.38–1.48, carapace height / width = 0.48–0.68, PER / carapace width = 0.33–0.35, PER/OAL = 2.19–2.92, PER/AER = 1.21–1.28, OAL/OQL = 1.14–1.60, OQP/ OQA = 1.17–1.33, clypeus height / AME = 1.00–1.25, cheliceral length / clypeus height = 11.50–16.00, sternum length / width = 1.20–1.36, palpal coxa length / width = 2.00–2.86, femur I length / carapace width = 1.18–1.23, metatarsus I length / carapace width = 0.95–1.05, femur IV length / carapace width = 1.23–1.33, cymbium length / carapace width = 0.52–0.57, cymbium length / palpal patella length = 2.00–2.75, cymbium length / palpal tibia length = 2.20–3.00, cymbium length / palpal femur length = 0.86–1.00, palpal tibia length / palpal patella length = 0.80–1.00. Genitalia as in Figs. 28 C, 29 H, 40 A–C, 41 A–F. **Female** (N= 3) Total length 7.90–10.50; carapace length / width = 1.47–1.48, carapace height / width = 0.50–0.59, PER / carapace width = 0.42–0.43, PER/OAL = 3.13–3.15, OAL/OQL = 1.15–1.25, OQP/ OQA = 1.13–1.32, clypeus height / AME = 1.25–1.50, cheliceral length / clypeus height = 8.67–10.50, sternum length / width = 1.24–1.27, palpal coxa length / width = 2.33–2.62, femur I length / carapace width = 0.93–1.00, metatarsus I length / carapace width = 0.79–0.83, femur IV length / carapace width = 1.07–1.09, palpal tarsus length / carapace width = 0.47–0.48, palpal tibia length / palpal patella length = 2.00–2.33, palpal tarsus length / palpal tibia length = 1.60–1.75, palpal tarsus length / palpal femur length = 0.93–1.00, palpal tibia length / palpal patella length = 1.25–1.33. Genitalia as in Figs. 72 E, F, 81 A, D.

**Material examined.** MADAGASCAR: *Antananarivo Province*: 3 km 41°NE Andranomay, 11.5 km 147°SSE Anjozorobe, 18°28'24"S, 47°57'36"E, elev. 1300m, pitfalls in montane rainforest, 5–13 December 2000, Fisher-Griswold Arthropod Team, BLF2370 (Holotype, CASENT9025464 1♂, CAS), Paratypes: (CASENT9026388, 1♂, 1♀, CAS), (CASENT9065668, 1♂, CAS), (CASENT9065669, 1♂, CAS), (CASENT9002190, 5♂, CAS), (CASENT9065665, 5♂, CAS), (CASENT9065666, 5♂, CAS), (CASENT9065667, 5♂, CAS), (CASENT9002693, 4♂, CAS), (CASENT9065662 1♂, CAS), (CASENT9065663 1♂, CAS), (CASENT9065664 1♂, CAS), (CASENT9065661, 5♂, CAS), (CASENT9065660, 5♂, CAS); general collecting, montane rainforest [BLF2543] (CASENT9004118, 1♂, CAS), general collecting, [BLF2377] (CASENT9007941, 1♂, CAS). *Fianarantsoa Province*: 2 km W Andrambovato, along River Tata-maly, 21°30'42"S; 047°24'36"E, elev. 1075m, sifted litter (leaf mold, rotten wood), 3–5 June 2005, Fisher-Griswold Arthropod Team, [BLF12164] (CASENT9065339, 1♀, CAS).

**Natural history.** The natural history of the small, cribellate *Uduba fisheri* is mysterious. Both collection localities are from montane rainforest along the eastern escarpment in central Madagascar. At least one female from near the River Tata-maly was extracted from leaf litter or from within rotting logs. Although we spent more than 100 person hours collecting and observing in the forest at 3 km 41°NE Andranomay, including many hours of both day and night, we have no record that these were ever observed alive in the field. The only times that our team was not searching for and collecting spiders was during heavy rainstorms, or after midnight at night. Yet, this was one

of the most common arthropods collected in our pitfall traps. During the trapping period of seven days and nights (times 100 pitfall traps, equaling 700 pitfall trap nights) we collected 143 males and 2 females of *Uduba fisheri*. Obviously, males are far more active than females, and their period of peak activity may be during intense rain, or late at night, or both.

**Distribution.** The species *Uduba fisheri* is known from two localities in montane rainforest along the eastern escarpment in Antananarivo and Fianarantsoa provinces in central Madagascar (Maps 9, 17).

### *Uduba funerea* Simon, 1906

Figures 79 C–E, Maps 2, 15.

*Uduba funerea* Simon 1906, holotype female from Suberbieville, Madagascar, specimen AR231 from Muséum National d'Histoire Naturelle, Paris, examined. **Species status restored.**

*Uduba dahli*: Lehtinen, 1967 [misidentification, not *dahli* Simon 1903; **Synonymy rejected**]

**Identification.** We have examined the holotype of *Uduba funerea* Simon 1906 from Suberbieville, Madagascar. See discussion below under **Distribution** for more information on the location of Suberbieville.

**Remarks.** Lehtinen accepted Simon's (1903) use of *Uduba dahli* as a replacement name for the preoccupied *Marussencia madagascariensis* Dahl 1901b. Lehtinen (1967: 272) also proposed as a new synonym *U. funerea* Simon 1906 equal to *U. dahli* Simon 1903. Whereas the females of each species are similar to each other, that of *U. funerea* has an entire cribellum and that of *U. dahli* (*Marussencia madagascariensis* Dahl 1901b) has a divided cribellum (Fig. 34 C). We consider this difference in cribellar form to be species diagnostic for our revision and therefore we reject the synonymy of *U. funerea* Simon 1906 with *U. dahli* Simon 1903.

**Diagnosis.** *Uduba funerea* belong to Group I.c, the *Uduba funerea* group (Map 15) of Group I, the Epigynal atrium group. They are cribellate, with cribellum entire. Males are unknown. The females of *Uduba funerea* can be distinguished from those of other *Uduba* having an entire cribellum and an epigynal plate with median lobe surrounded by depressed atrium (Fig. 79 C); the entire cribellum is unlike *U. dahli* Simon 1903 but like *Uduba halabe*. *Uduba funerea* can be distinguished from *U. halabe* by having the copulatory openings hidden beneath the lateral margins of the atrium (Fig. 79 E); in *U. halabe* the CO are located centrally beneath the epigynal median lobe (Figs. 74 C, F).

**Description. Female** (holotype). We made a detailed examination of the female holotype but upon returning the specimens to the Muséum National d'Histoire Naturelle in Paris in the 1990's we kept only a few somatic illustrations and detailed illustrations and measurements of the female genitalia. We are therefore unable to provide details of measurements and spination for the holotype and can only describe and illustrate the female genitalia in detail. Cribellum entire. **Female genitalia** (Holotype) Epigynal plate with median lobe surrounded by depressed atrium (Fig. 79 D), plate width 1.49 times length; atrium sides concave, atrium wide, width 1.80 times atrium length; epigynum length 1.90 times atrium length, atrium width 0.58 times epigynum width; atrium width at side of ML 1.88 times ML width; atrium and median lobe base arise anteriad of epigastric groove (Fig. 79 C), atrium base at 0.20 of epigynal plate length, median lobe narrow, slightly wider at base, median lobe length 2.70 times width, ML extends to apex of atrium, ML length 0.60 times epigynal length; lateral lobes narrow, atrium width 4.50 times LL width; copulatory openings hidden beneath lateral sides of atrium, distance between CO 0.62 width of epigynal plate, CO distance from epigastric furrow 0.50 times epigynum length. Vulva (Figs. 79 D, E) with spermathecal ducts asymmetrical, on left making three broad, transverse curves, on right three opposed loops, vulva length 0.65 times width, vulva width 4.50 times distance between fertilization ducts.



**Variation.** Unknown: only the female holotype of *Uduba funerea* Simon 1906 is known.

**Material examined.** Only the holotype female, specimen AR231 at MNHN, Paris, from “Suberbieville”, Madagascar.

**Natural history.** Unknown. The female has an entire cribellum, suggesting use of cribellate silk.

**Distribution.** *Uduba funerea* Simon 1906 is known only from the type locality, “Suberbieville”, in Majunga Province, Madagascar, approximately 240 km NNW of Antananarivo (Maps 2, 15). Gold mining has been conducted in this region since the late 1800’s. The town, formerly called Suberbieville after the industrialist who exploited the gold of the Ikopa River, is now known as Maevatanana and is located on the right bank of the Ikopa River, south of its confluence with the Betsiboka River. It is located at about 70m elevation at approximately S16°57’00”, E46°50’00” and is the main stop of the RN 4, the road connecting Antananarivo to Mahajanga.

### *Uduba goodmani*, new species

Figures 7 D, 20 F, 77 A–C, 80 E, F, Maps 6, 16.

**Type material.** Holotype female from camp 5 at 1875m elevation in Réserve Naturelle Intégrale d’Andohahela (24°33.7’S, 46°43.3’E), Toliara Province, Madagascar, collected 27 November–5 December 1995 by S. Goodman (SG1995-01) (CASENT9006074), deposited in FMNH. Paratype female (CASENT9009538) from montane rainforest at 900m elevation at Col du Sedro in Parc National d’Andohahela (24°45’50”S, 46°45’6”E), Toliara Province, Madagascar, collected 21–25 January 2002 by the Fisher-Griswold Arthropod Team, deposited in CAS.

**Etymology.** The species epithet is a patronym in honor of Steve Goodman, naturalist, author, collector and mammologist who has made substantial contributions to our knowledge of Madagascar biodiversity.

**Diagnosis.** *Uduba goodmani* belong to Group II, the Epigynum lateral projection group, or *Uduba evanescens* group (Map 16). They are ecribellate. Females can be distinguished from those of other *Uduba* species by the form of the female genitalia (Figs. 77 A–C, 80 E, F): epigynal plate a broad oval, width 1.50 times length, lateral lobes with convex edges forming ridges on each side (Fig. 80 E); vulva broad, width one and-a-half times length with spermathecal ducts characteristic, forming one and-a-half loose, transverse loops (Fig. 80 F), copulatory duct lateral and extending mesally to lead to posterior, widely spaced fertilization ducts. Males are unknown.

**Description. Male:** Unknown. **Female (Holotype):** Total length 16.43. Markings as in Fig. 7 D. Carapace 8.50 long, 5.71 wide, 3.50 high; clypeus 0.43 high. Eye diameters: AME 0.27, ALE and PME 0.36, PLE 0.38. Chelicerae 3.79 long; sternum 3.71 long, 2.79 wide; labium 1.82 long; palpal coxae 2.82 long. With a colulus (Fig. 20 F). Spination: palpus–femur d0-1-1, p0-0-1, patella p1-0, tibia p2-1, tarsus p2-1, r1-0-0; leg I–femur d1-0-0, p0-0-1, tibia v2-2-2-0, metatarsus v2-2-3; leg II–femur d1-0-0, p0-0-1, tibia p0-0-1-0, v1-1-1-0, metatarsus v2-2-3; leg III–femur d0-0-0-1, p1-1-0-0-2, r1-1-0-1, tibia d0-1-0, p0-1-1-0, v1-2-0, r0-1-1-0, metatarsus p1-1-2, v2-2-2, r1-1-2; leg IV–femur d1-0-1-0, tibia v1-1-2, metatarsus p0-0-2-2, v2-1-2-2, r1-2-2. Scopulae: strong ventral beneath all tarsi and metatarsi and beneath tibiae I and II. Leg measurements (paratype, CASENT9009538): I: 4.20 + 2.00 + 3.60 + 3.10 + 2.00 = 14.90; II: 3.90 + 2.00 + 3.10 + 2.90 + 1.90 = 13.80; III: 3.20 + 1.50 + 1.90 + 2.80 + 1.55 = 10.95; IV: 4.20 + 1.80 + 3.60 + 4.10 + 1.90 = 15.60; palpus: 2.10 + 1.00 + 1.10 + NA + 1.80 = 6.00. Leg formula 4123. **Female genitalia** (holotype): epigynal plate without depressed atrium, lateral lobes extending to sides forming blunt, earlike lobes (Figs. 77 A, C), plate width 1.63 times length; width between bases of LL 0.72 times epigynum width; lateral ears short and blunt (Fig. 80 E), arising near epigastric furrow, lateral ears (LL side) width 0.75 times LL side length, (LL side) width 0.16 times width epigynum;

median lobe a flat plate, each side with an oblique bulge where copulatory openings are found, ML width 0.64 times epigynum width, 1.36 times ML length, CO origin at 0.485 epigynum length from epigastric furrow, distance between copulatory openings 0.41 times epigynum width. Vulva (Fig. 77 B) with copulatory ducts lateral, median to these spermathecal ducts forming a single longitudinal loop (Fig. 80 F), vulva length 0.53 times width, fertilization ducts widely separated, vulva width only 3.21 times distance between FD.

**Variation.** (N=2): Carapace length / width = 1.49–1.51, carapace height / width = 0.61–0.64, PER / carapace width = 0.45–0.69, PER/OAL = 2.70–2.90, PER/AER = 1.30–1.32, OAL/OQL = 1.00–1.25, OQP / OQA = 1.07–1.18, clypeus height / AME = 1.60–1.75, cheliceral length / clypeus height = 7.71–8.83, sternum length / width = 1.22–1.33, palpal coxa length / width = 2.11–2.39, femur I length / carapace width = 1.08–1.14, metatarsus I length / carapace width = 0.58–0.79, femur IV length / carapace width = 1.08–1.09, palpal tarsus length / carapace width = 0.44–0.46, palpal tibia length / palpal patella length = 1.59–1.80, palpal tarsus length / palpal tibia length = 1.40–1.64, palpal tarsus length / palpal femur length = 0.80–0.86, palpal tibia length / palpal patella length = 1.10–1.14. Epigynal plate (Figs. 77 A, C, 80 E) width 1.50–1.63 times length, width between bases of LL 0.72–0.75 times epigynum width, CO origin at 0.43–0.48 epigynum length from epigastric furrow, distance between copulatory openings 0.33–0.41 times epigynum width; vulva (Figs. 77 B, 80 F) with spermathecal ducts forming one and-a-half loose, transverse loops, vulva length 0.53–0.64 times width, fertilization ducts widely spaced, vulva width 2.58–3.21 times distance between FD.

**Material examined.** MADAGASCAR: *Toliara Province*: Réserve Naturelle Intégrale d'Andohahela, 20.0 km SE Andranondambo, camp 5, 24°33.7'S, 46°43.3'E, elev. 1875m, 27 November–5 December 1995, S. Goodman [SG1995-01] (Holotype, CASENT9006074, 1♀, FMNH); Parc National d'Andohahela, Col du Sedro, 3.8 km 113°ESE Mahamavo, 37.6 km 341°NNW Tolagnaro, 24°45'50"S, 46°45'6"E, montane rainforest at 900m elevation, general collecting ground spiders, 21–25 January 2002, Fisher-Griswold Arthropod Team (Paratype, CASENT9009538, 1♀, CAS).

**Natural history.** Collection data suggest that the species *Uduba goodmani* occurs in montane rain forest.

**Distribution.** *Uduba goodmani* are known only from two nearby localities on mountains at Andohahela in far southeastern Madagascar (Maps 6, 16).

### *Uduba hainteny*, new species

Figures 42 A–C, Maps 1, 13.

**Type material.** Holotype male (CASENT9032857) from rainforest at 1000m elevation in Forêt Ivohibe, 24°34'08"S, 047°12'14"E, Toliara Province, Madagascar, collected 2–4 December 2006 by B. L. Fisher *et al.*, deposited in the CAS.

**Etymology.** The species epithet, *hainteny*, refers to a traditional form of Malagasy oral literature and poetry; a noun in apposition.

**Diagnosis.** *Uduba hainteny* belong to Group I.a, the *Uduba dahli* group (Map 13) of Group I, the Epigynal atrium group. They are ecibellate with a colulus; male palp (Figs. 42 A–C) with apex of TA3 a slender, pointed screw, TA2 a large, elongate oval blade, visible behind and beyond TA3, apex rounded; MA simple with small prolateral hook. The species *Uduba hainteny* is very similar to *Uduba ibonia* except that the latter has a divided cribellum (Fig. 20 B). The large and conspicuous TA2 (Fig. 41 B) distinguishes *U. hainteny* from *U. fandroana*, which has a small, inconspicuous TA2 (Figs. 39 A, B). The small MA distinguishes *U. hainteny* from *U. lamba*, which has a large, complex MA (Figs. 49 B, C). Female unknown.

**Description.** Male (Holotype, CASENT9032857): Total length 9.50. Markings typical for *Uduba*. Carapace 5.90 long, 4.30 wide, 1.79 high; clypeus 0.25 high. Eye diameters: AME and ALE 0.22, PME 0.25, PLE 0.26. Chelicerae 2.40 long; sternum 2.60 long, 2.10 wide; labium 1.40 long; palpal coxae 2.00 long. **Ratios**—carapace length / width = 1.37, carapace height / width = 0.53, PER / carapace width = 0.37, PER / OAL = 2.86, PER / AER = 1.38, OAL / OQL = 0.93, OQP / OQA = 1.15, clypeus height / AME = 1.36, cheliceral length / clypeus height = 8.00, sternum length / width = 1.24, palpal coxa length / width = 2.50, femur I length / carapace width = 1.40, metatarsus I length / carapace width = 1.56, femur IV length / carapace width = 1.44, cymbium length / carapace width = 0.65, cymbium length / palpal patella length = 2.80, cymbium length / palpal tibia length = 2.80, cymbium length / palpal femur length = 1.40, palpal tibia length / palpal patella length = 1.00. With a colulus. Spination: palpus—femur d0-1-0-1, p0-0-1, r0-0-1; leg I—femur d1-1-0-1, p0-1-1-0, r0-1-1-0, tibia d0-0-1-0, p0-1-1-0, v2-2-2-2, r0-1-1-0, metatarsus p1-2-1, v2-1-1, r1-1-1; leg II—femur d1-1-0-1, p0-1-1-0, r0-1-1-0, tibia d0-0-1-0, p0-1-1-0, v2-2-2-2, r0-1-1-0, metatarsus p1-2-2, v2-2-2-2, r1-0-1-0; leg III—femur d1-1-0-1, p0-1-0-1-1, r0-1-0-1-1, patella r1, tibia d0-0-1-0, p0-1-1-0, v2-0-2, r0-1-1-0, metatarsus d0-1-0-0, p1-1-2, v2-2-2, r1-1-2; leg IV—femur d1-1-0-1, p0-1-0-1, r0-0-0-1, tibia d0-0-1-0, p0-1-1-0, v2-1-2, r0-1-1-0, metatarsus, p1-1-1-2, v2-1-2-2, r1-1-1-2. Scopulae: cymbium, apicodorsal; dense beneath tarsi I–IV. Leg measurements: I:  $6.00 + 2.30 + 6.20 + 6.70 + 3.50 = 24.70$ ; II:  $5.30 + 2.30 + 5.30 + 5.80 + 3.00 = 21.70$ ; III:  $4.60 + 1.70 + 3.30 + 5.00 + 2.50 = 17.10$ ; IV:  $6.20 + 2.10 + 5.90 + 8.00 + 3.40 = 25.60$ ; palpus:  $2.00 + 1.00 + 1.00 + \text{NA} + 2.80 = 6.80$ . Leg formula 4123. **Male palp** (Figs. 42 A–C): palpal tibia 0.39 times cymbial length, RTA a triangle, length 0.20 tibia length, length equal to width, with pointed apex (Fig. 42 C), VTA conical, with broad base and slender apex, length 0.36 tibia width, VTA length 1.71 times width; tibia lacking stout spines; tegulum length 0.87 times width; TA1 extends distad of tegulum apex, TA1 extends past TA3 apex by 1.425 times tegulum length; TA3 a slender, pointed screw, TA3 ends before TA2 apex, TA2 a large, elongate oval blade (Fig. 42 B), visible behind and beyond TA3, apex rounded; MA simple with small prolateral hook (Fig. 42 C), origin at 0.42 times tegulum length, tegulum apex at 0.44 tegulum length from MA apex, length (including apical processes) 0.625 times width, MA small, length 0.21 tegulum length, width 0.29 tegulum width; conductor fan concave (Fig. 42 B).

**Variation.** Unknown, only the male holotype of *Uduba hainteny* is known.

**Material examined.** MADAGASCAR: *Toliara Province*: Forêt Ivohibe, 55.0 km N Tolagnaro, 24°34'08"S, 047°12'14"E, elev. 200m, malaise trap, rainforest, 2–4 December 2006, B. L. Fisher *et al.*, [BLF15448] (holotype, CASENT9032857, 1♂, CAS).

**Natural history.** The holotype male of *Uduba hainteny* was collected in lowland rainforest. Retrieval from a malaise trap reveals that the spiders will climb.

**Distribution.** The species *Uduba hainteny* is known only from the type locality in southern Madagascar (Maps 1, 13).

### *Uduba halabe*, new species

Figures 11 B, 20 A, 27 A, B, 28 D, 43 A–C, 74 C, F, Maps 2, 13.

*Uduba* undetermined species 1, Griswold (1993): pp. 7, 11, 12, 26, 31, figs. 13–16, 76, 84. Griswold *et al.* (2005):

*Uduba dahli*: Griswold *et al.*, 2005: 44, Figs. 97, 104, 141, 143, 153, 156, 185, 194B, 198 (misidentification, not *dahli* Simon, 1903).

**Types.** Holotype male (CASENT9006018) from 1100m elevation in Parc National Ranomafana, 12Km 7 km W Ranomafana, Fianarantsoa Province, Madagascar, collected 22–31 October 1988 by W. Steiner, deposited in Smithsonian, National Museum of Natural History

(USNM); paratype male, same data, (CASENT9006017) also deposited in USNM. Paratype male and female, also from Parc National Ranomafana, 12Km W of Ranomafana, radio tower at forest edge, 21°15.05'S, 47°24.43'E, elev. 1130m, collected by M. Irwin and Harin'Hala Rin'ha in malaise trap in mixed tropical forest, male (CASENT9032854) collected 15–26 November 2003 and female (CASENT9017833) collected 9–20 March 2003, both deposited in CAS. Paratypes, two females (CASENT9006014 and CASENT9006015), from 1200m elevation in Réserve Naturelle Intégrale d'Andohahela, collected 7–17 November 1995 by S. Goodman. Deposited in FMNH.

**Etymology.** The species name is from the combination of Malagasy words: *hala* = spider and *be* = large, i.e., “big spider.”

**Note.** Specimens of this species were used as exemplars in the previous studies of Griswold (1993) and Griswold et al (2005). References in Griswold (1993) are to “*Uduba undetermined species I*,” on pp. 7, 11, 12, 26, male and female from Madagascar, Forsyth Major, BMNH; males from 7 km W Ranomafana, Fianarantsoa Prov., Madagascar, 22–31 Oct 1988, W. Steiner, USNM (Miturgidae, Uliodoninae); p. 11, figures 13, 14, male palpus ventral, prolateral, SEM images; p. 12, figs. 15, 16: = female genitalia, epigynum ventral, vulva dorsal; p. 26, fig. 76, tarsal organ; Figure 84, page 31, cladogram showing sister species relationship of *Uduba dahli* and *Uduba* sp. 1 (= *Uduba halabe* sp. nov.) at node W. References in Griswold et al. (2005) are to specimens misidentified as *Uduba dahli* Simon 1903: Figs. 97, 104, 141, 143, 153, 156, 185, 194 and 198. **Figure 97.** Female cribellar spinning organs. C, F. *Uduba* sp. from Ranomafana, Madagascar. **Figure 104.** Right spinnerets of female *Uduba* sp. from Ranomafana, Madagascar. A. Overview. B. ALS. C. PMS. D. PLS. Inset: MS and two flanking spigots. **Figure 141.** Legs of Entelegynae. D. *Uduba* sp. female from Andohahela Madagascar, tarsus IV showing ventral scopula, STC and ITC (line), and multiple rows of dorsal trichobothria (the long dorsal setae extending out in all directions). F. *Uduba* sp. male from Andohahela, Madagascar, femur to tibia base, tibia broken along tibial crack (arrow to broken face of tibia). **Figure 143.** Female calamistra. C. *Uduba* sp. from Andohahela, Madagascar, oval calamistrum, detail below. **Figure 156.** Trichobothrial bases. G. *Uduba* sp. from Ranomafana, Madagascar, male tarsus I.

**Diagnosis.** *Uduba halabe* are members of Group I.a, the *Uduba dahli* group (Map 13) of Group I, the Epigynal atrium group. They are cribellate with cribellum entire (Fig. 20 A). Males (Figs. 27 A, B, 28 D, 29 D, 43 A–C) can be distinguished from those of other *Uduba* by having a large, screw shaped TA3, an inconspicuous TA2, and a small, simple MA (Fig. 28 D). The male palp is very similar to that of *Uduba dahli* Simon 1903 but the former has a vestige of a divided cribellum, whereas the male of *Uduba halabe* has a vestige of an entire cribellum. The females of *Uduba halabe* can be distinguished from those of other *Uduba* having an entire cribellum (Fig. 20 A) and an epigynal plate with median lobe surrounded by depressed atrium (Fig. 74 C); the entire cribellum is unlike *U. dahli* (Fig. 34 C) but like that of *Uduba funerea* Simon 1906. *Uduba halabe* can be distinguished from *U. funerea* by having the copulatory openings hidden centrally beneath the epigynal median lobe (Fig. 74 F); in *U. funerea* the CO are beneath the lateral margins of the atrium (Figs. 79 C–E).

**Description. Male** (Holotype): Total length 18.29. Markings as in Fig. 11 B. Carapace 10.86 long, 7.64 wide, 4.14 high; clypeus 0.64 high. Eye diameters: AME and PME 0.36, ALE 0.38, PLE 0.41. Chelicerae 5.36 long; sternum 6.07 long, 3.71 wide; labium 1.68 long; palpal coxae 3.33 long. Cribellum entire. Spination (BMNH, Forsyth Major), palpus–femur d0-0-0-1, p0-0-0-2; leg I–femur d1-0-0-1, p0-0-0-2, tibia p0-1-1-0, v2-2-2-2, r0-1-0, metatarsus v2-2-3; leg II–femur d1-0-0-1, p1-0-0-2, r0-1-0-1, tibia p0-1-1-0, v2-2-2-2, r0-1-1-0, metatarsus p1-1-1, v2-2-2; leg III–femur d0-0-1-1, p1-0-1-1, r1-0-1-1, tibia d0-1-0, p0-1-1-0, v1-2-2, r0-1-1-0, metatarsus p1-2-2, v2-2-2,

r1-1-2; leg IV—femur d1-1-1, p0-0-0-1, r0-0-0-1, tibia p0-1-0-0, v2-2-2, r0-1-1-0, metatarsus, p1-2-2, v0-2-2-1, r1-2-2. Scopulae: cymbium, apicodorsal; moderate beneath all tarsi and apices of metatarsi I and II, weak beneath apices of metatarsi III and IV. Leg measurements [Holotype]: I:  $9.71 + 3.86 + 9.29 + 10.29 + 4.43 = 37.57$ ; II:  $9.14 + 3.57 + 7.86 + 9.00 + 4.71 = 34.29$ ; III:  $7.43 + 3.29 + 5.29 + 7.43 + 3.71 = 27.14$ ; IV:  $10.29 + 3.43 + 9.00 + 12.00 + 4.57 = 39.29$ ; palpus:  $3.86 + 1.57 + 1.64 + \text{NA} + 5.14 = 12.21$ . Leg formula 4123. **Male palp** (Holotype) (Figs. 27 A, B, 28 D, 29 D, 43 A–C): palpal tibia 0.35 times cymbial length, RTA broad, triangular (Fig. 43 C), RTA length 0.52 tibia, RTA length equals width, apex a blunt point, VTA length 1.57 times width, a short cone (Figs. 43 A, C), length 0.35 tibia width; tibia lacks stout spines; tegulum convex, without ridge, tegulum length 1.02 times width; TA1 extends distad of tegulum apex, TA1 extends past TA3 apex by 1.09 times tegulum length; TA3 very large, screw-shaped with subapical grooves, extends apicad of TA3 to TA2 by 1.26 tegulum length, TA2 a small, simple mound (Figs. 27 A, B, 28 D), hidden behind TA3 apex; MA small (Figs. 29 D, 43 B, C), simple, length (including apical processes) 0.67 times width, MA length 0.19 tegulum length, width 0.29 tegulum width, origin at 0.40 tegulum length, tegulum apex at 0.33 tegulum length from tegulum apex; conductor fan concave or entire (Figs. 27 A, 43 C). **Female** (paratype, CASENT9017833): Total length 21.00. Markings as in male. Carapace 11.40 long, 7.60 wide, 4.20 high; clypeus 0.80 high. Eye diameters: AME 0.34, ALE and PME 0.38, PLE 0.40. Chelicerae 6.20 long; sternum 4.60 long, 3.60 wide; labium 2.60 long; palpal coxae 3.90 long. Cribellum entire (Fig. 20 A). Spination: palpus—femur d0-0-1, p0-0-1, patella p1, tibia p2-0, tarsus p2-1-1; leg I—femur d1-0-0-1, p0-0-0-1, tibia v2-2-2-2, metatarsus v2-1-2-0; leg II—femur d1-0-0-0, p0-0-0-1, tibia p0-0-1-0, v2-1-1-2, metatarsus p0-0-1, v2-2-1; leg III—femur d0-0-0-1, p1-0-1-1, r1-0-0-1, tibia d0-0-1-0, p0-1-1-0, v2-2-2, r0-1-1-0, metatarsus p1-1-2, v2-2-2, r1-1-2; leg IV—femur d0-0-0-1, p1-0-0-0, tibia v1-2-2, r0-1-1-0, metatarsus p1-0-0-2, v2-2-2, r1-2-2. Scopulae: strong ventral beneath all tarsi and beneath metatarsi I and II and apices of metatarsi III and IV. Leg measurements: I:  $7.70 + 3.50 + 6.70 + 6.00 + 3.50 = 27.40$ ; II:  $6.70 + 3.50 + 5.10 + 5.10 + 3.00 = 23.40$ ; III:  $5.80 + 3.10 + 3.60 + 4.50 + 2.80 = 19.80$ ; IV:  $7.70 + 3.30 + 6.00 + 7.50 + 3.40 = 27.90$ ; palpus:  $4.30 + 2.20 + 2.30 + \text{NA} + 3.90 = 12.70$ . Leg formula 4123. **Female genitalia** (paratype, Andohahela, CASENT9006015, FMNH): epigynal plate with median lobe surrounded by depressed atrium (Fig. 74 C), plate width 1.42 times length; atrium sides deeply concave, atrium wide, width 1.51 times atrium length; epigynum length 1.38 times atrium length, atrium width 0.77 times epigynum width; atrium width at side of ML 0.705 times ML width; atrium and median lobe extend almost to epigastric groove, atrium origin near epigastric groove at 0.04 of epigynal plate length, median lobe broad, slightly wider at base, median lobe length 1.59 times width, ML ends just beyond atrium apex, ML length extends 0.05 times epigynum length anterior of atrium, ML length 0.69 times epigynal length; lateral lobes very narrow, atrium width 7.16 times LL width; copulatory openings hidden beneath median lobe, distance between CO 0.29 width of epigynal plate, CO distance from epigastric furrow 0.51 times epigynum length. Vulva (Fig. 74 F) with spermathecal ducts making three broad, transverse curves, vulva length 0.72 times width, vulva width 6.70 times distance between fertilization ducts.

**Variation.** **Male** (N = 6): Total length = 13.00–23.00, carapace length / width = 1.33–1.84, carapace height / width = 0.40–0.55, PER / carapace width = 0.35–0.86, PER/OAL = 2.87–3.07, PER/AER = 1.22–1.41, OAL/OQL = 1.05–1.16, OQP/ OQA 1.00–1.37, clypeus height / AME = 1.50–2.22, cheliceral length / clypeus height = 6.13–10.29, sternum length / width = 1.29–1.63, palpal coxa length / width = 2.33–2.75, femur I length / carapace width = 1.27–1.31, metatarsus I length / carapace width = 1.35–1.51, femur IV length / carapace width = 1.27–1.43, cymbium length / carapace width = 0.61–0.67, cymbium length / palpal patella length = 3.17–3.40, cymbium length / palpal tibia length = 2.60–3.19, cymbium length / palpal femur length = 1.15–1.33, pal-



pal tibia length / palpal patella length = 1.07–1.25. Male palpus as in Figs. 27 A, B, 28 D, 29 D, 43 A–C. **Female** (N = 3): Total length = 17.43–22.86, carapace length / width = 1.34–1.50, carapace height / width = 0.55–0.70, PER / carapace width = 0.43–0.73, PER/OAL = 2.57–3.64, PER/AER = 1.38–1.40, OAL/OQL = 1.12–1.17, OQP/ OQA = 1.11–1.16, clypeus height / AME = 2.00–2.35, cheliceral length / clypeus height = 7.00–7.75, sternum length / width = 1.23–1.28, palpal coxa length / width = 2.06–2.29, femur I length / carapace width = 1.01–1.16, metatarsus I length / carapace width = 0.79–0.84, femur IV length / carapace width = 1.01–1.08, palpal tarsus length / carapace width = 0.51–0.54, palpal tarsus length / palpal patella length = 1.69–2.00, palpal tarsus length / palpal tibia length = 1.59–1.73, palpal tarsus length / palpal femur length = 0.87–0.93, palpal tibia length / palpal patella length = 1.05–1.15.

**Material examined.** MADAGASCAR: *Locality unknown*: Voucher for Lycosoidea phylogeny, Griswold (1993: 7), “*Uduba undetermined species I*”, collected by Forsyth-Major (1♂, 1♀, BMNH). *Fianarantsoa Province*: Parc National Ranomafana, 12Km W of Ranomafana, radio tower at forest edge, 21°15.05'S, 47°24.43'E, elev. 1130m, malaise trap in mixed tropical forest, 15–26 November 2003, M. Irwin and Rin'ha Harin'Hala [MA-02-09B-79] (paratype, CASENT9032854, 1♂, CAS), 9–20 March 2003 [MA-02-09B-55] (CASENT9017833, 1♀, CAS), 5–13 June 2006 [MG-09B-151] (CASENT9042520, 1♂, CAS); Parc National Ranomafana, Belle Vue at Talatakely, 21°15.99'S, 47°25.21'E, el.1020m, malaise trap in secondary tropical forest, 16 October–18 November 2001, M. Irwin and Harin'Hala Rinha [MA-02-09C-01] (CASENT9030896, 1♂, CAS), 31 March–7 April 2002 [MA-02-09C-23] (CASENT9006016, 1♂, CAS); Parc National de Ranomafana, Vatoharanana, 4.0 km SW Ranomafana (ville), 21°14.7'S, 047°26.0'E, elev. 1025m, pitfalls, slightly transitional lowland to lower montane rainforest, 3–9 October 2000, coll. S. Goodman, [FMNH#00-225] (CASENT9064650, 4♂, FMNH, CASENT9064651, 4♂, FMNH); Parc National Ranomafana, Vohiparara, at broken bridge, 21°13.57'S, 47°22.19'E, elev. 1110m, malaise trap in high altitude rainforest, 22–29 April 2002, M. Irwin, R. Harin'Hala [MA-02-09A-26] (CASENT9030904, 1♂, CAS); Ifanadiana, Ranomafana N. P. 21.25572°, 47.42152°, elev. 1300m, 9 November 2008, K. B. Miller, (MSBA39189, 1♀, MSBA39190, 1♂, U-New-Mexico); Ranomafana N. P., 23 March 1992, V. and B. Roth, Kariko/Roth Voucher Collection (CASENT9006019, 1♂, MCZ); 7 km W Ranomafana, elev. 1100m, 22–31 October 1988, W. Steiner (paratype, CASENT9006017, 1♂, USNM), (Holotype, CASENT9006018, 1♂, USNM); 9 km NE Ivohibe, 6.5 km ESE Angodongodona, 22°25.6'S, 046°56.3'E, Camp 5, undisturbed rainforest, pitfall traps #13–15, 12–17 September 1997, S. Goodman (CASENT9006001, 1♂, FMNH), (CASENT9006039, 8♂, FMNH). *Toliara Province*: Réserve Naturelle Intégrale d'Andohahela, 8 km NW Eminiminy, parcel 1, camp 1, 24°37.6'S; 46°45.9'E, elev. 440m, 19–28 October 1995, S. Goodman (CASENT9006010, 6♂, FMNH), (CASENT9006009, 1♂, FMNH), (CASENT9006023, 9 ♂, FMNH), (CASENT9006011, 1♂, FMNH), (CASENT9006013, 6♂, FMNH), (CASENT9006012, 4♂, FMNH), (CASENT9006022, 4♂, CAS); Réserve Naturelle Intégrale d'Andohahela, 13.5 km NW Eminiminy, parcel 1, camp 3, 24°35.0'S; 46°44.1'E, elev. 1200m, 7–17 November 1995, S. Goodman (paratype, CASENT9006015, 1♀, 3jj, FMNH), (paratype, CASENT9006014, 1♀, 1jj, FMNH).

**Natural history.** All records of *Uduba halabe* are from rainforest or forest edge, from 400 to 1200 meters in elevation. Females have been collected on the forest floor and in malaise traps in low vegetation; males have been collected in pitfalls, malaise traps and even in canopy traps. Adult males and occasionally adult females wander. The entire, functional cribellum suggests that this species uses cribellate silk but there are no observations of burrows or webs.

**Distribution.** The species *Uduba halabe* occurs in low to mid elevation rainforest in the southeastern third of Madagascar (Maps 2, 13).

***Uduba heliani*, new species**

Figures 5 D, E, 72 A, B, Maps 11, 16.

**Type material.** Holotype female (CASENT9006106) from 530m elevation in Forêt Classée Andriantantely (18°41.7'S, 048°48.8'E), Toamasina Province, Madagascar, collected 4–7 December 1998 by Helian Ratsirarson, deposited in CAS.

**Etymology.** The species epithet is a patronym in honor of Mr. Helian Ratsirarson, Malagasy entomologist, Lakeside International Scholar at CAS and member of the Fisher-Griswold Arthropod Team that collected widely throughout Madagascar.

**Diagnosis.** *Uduba heliani* belong to Group II, the Epigynum lateral projection group, or *Uduba evanescens* group (Map 16). They have a divided cribellum. Females of *Uduba heliani* can be distinguished from those of other *Uduba* species by the female genitalia (Figs. 72 A, B): the epigynal plate is broadly oval (width 1.83 times length) with the copulatory openings beneath transverse grooves at mid-level of plate (Fig. 72 A), CO origin at 0.29 times of epigynum length; vulva with spermathecal ducts forming three longitudinal loops extending anterior of the CO (Fig. 72 B).

**Description. Male:** Unknown. **Female** (Holotype, CASENT9006106): Total length 6.10. Markings as in Figs. 5 D, E. Carapace 2.90 long, 2.00 wide, 1.20 high; clypeus 0.15 high. Eye diameters: AME 0.10, ALE and PME 0.12, PLE 0.16. Chelicerae 1.30 long; sternum 1.30 long, 1.10 wide; labium 0.60 long; palpal coxae 0.95 long. **Ratios**—carapace length / width = 1.40, carapace height / width = 1.40, PER / carapace width = 0.34, PER/OAL = 3.07, PER/AER = 1.34, OAL/OQL = 1.27, OQP/ OQA = 1.48, clypeus height / AME = 1.50, cheliceral length / clypeus height = 8.67, sternum length / width = 1.18, palpal coxa length / width = 2.11, femur I length / carapace width = 0.90, metatarsus I length / carapace width = 0.75, femur IV length / carapace width = 1.00, palpal tarsus length / carapace width = 0.50, palpal tibia length / palpal patella length = 2.00, palpal tarsus length / palpal tibia length = 2.00, palpal tarsus length / palpal femur length = 1.11, palpal tibia length / palpal patella length = 1.00. Cribellum divided. Spination: palpus—femur d0-1-0-2, patella p1-0, tibia p2-1, tarsus p2-1, r0-1-0; leg I—femur d1-0-0, tibia v1-1-1-2, metatarsus v2-2-2; leg II—femur d1-0-0, tibia v1-1-1-2, metatarsus p0-0-1, v2-2-2; leg III—femur d0-1-1-0, p0-1-1-0, r0-0-0-1, tibia d0-1-0, p1-0-1, v2-2-2, r0-1-1-0, metatarsus d0-1-0-0, p1-2-2, v2-2-2, r1-1-1; leg IV—femur d0-1-0, tibia v1-2-2, r0-1-1-0, metatarsus p0-0-1-2, v2-2-2, r0-1-1-1. Scopulae: weak ventral beneath tarsi I and II. Leg measurements: I: 1.80 + 0.90 + 1.50 + 1.40 + 1.10 = 6.70; II: 1.70 + 0.80 + 1.30 + 1.25 + 1.00 = 6.05; III: 1.25 + 0.70 + 0.80 + 1.10 + 0.60 = 4.45; IV: 2.00 + 0.80 + 1.50 + 1.60 + 1.00 = 6.90; palpus: 0.90 + 0.50 + 0.50 + NA + 1.00 = 2.90. Leg formula 4123. **Female genitalia** (Figs. 72 A, B): epigynal plate without depressed atrium, posterior margin at epigastric furrow convex but concave in center, plate width 1.83 times length, ML and LL not clearly defined, copulatory openings beneath transverse grooves at mid-level of plate, distance between copulatory openings 0.295 times epigynum width, CO origin at 0.29 times of epigynum length (Fig. 72 A), extent of plate laterad of copulatory openings equals 0.16 times plate width, plate with weak lateral projections, lateral margins well defined. Vulva with spermathecal ducts forming three anterior, longitudinal loops (Fig. 72 B), vulva length 0.80 times width, vulva width 6.25 times distance between fertilization ducts.

**Variation.** Unknown: only the unique holotype female is known.

**Material examined.** MADAGASCAR: Toamasina Province: Forêt Classée Andriantantely, 18°41.7'S, 048°48.8'E, elev. 530m, 4–7 December 1998, H. Ratsirarson [#HJ-121] (holotype,

CASENT9006106, 1♀, CAS).

**Natural history.** An individual of the cribellate *Uduba heliani* has been collected in mid-elevation rainforest; no other habitat data are available.

**Distribution.** *Uduba heliani* are known only from the type locality near the east coast of central Madagascar (Maps 11, 16).

***Uduba hiragasy*, new species**

Figures 28 A, 44 A–C, 72 C, D, Maps 10, 17.

**Type material.** Holotype male, CASENT9065679 and paratype female, CASENT9064772, from montane rainforest at 1385m elevation in Tsinjoarivo Forest, Antananarivo Province, Madagascar, collected 26–29 August 2014 by B. L. Fisher *et al.*, deposited in CAS. Paratypes, four males, same collection data (CASENT9065707, CASENT9065595, CASENT9065602 and CASENT9065698), deposited in CAS.

**Etymology.** The species epithet, *hiragasy*, refers to a musical tradition in Madagascar, with a daylong celebration of music, dances and performances. According to Wikipedia: “*Hiragasy* or *hira gasy* is a musical tradition in Madagascar, particularly among the *Merina* ethnic group of the Highland regions around the capital of Antananarivo. It is a day-long spectacle of music, dance, and *kabary* oratory performed by a troupe or as a competition between two troupes. (Wikipedia, ix-29-2021).” A noun in apposition.

**Diagnosis.** *Uduba hiragasy* belong to Group III, the *Uduba valiha* group (Map 17). They are cribellate with divided cribellum or vestige. Males differ from other species by having a retromedian ridge on the tegulum (Figs. 44 B, C), and a deeply bifid MA (Fig. 28 A) with the prolateral lobe slender, retrolateral lobe stout; *U. hiragasy* males differ from those of *U. valiha* by lacking the short, stout spine retrolateral spine from the palpal tibia (Fig. 28 A) (spine present in *U. valiha*, Fig. 64 C), by having the TA2 blunt, entire (Fig. 28 A) (apically rolled in *U. valiha*, Fig. 28 B) and the apex of the MA prolateral lobe slender truncate (Fig. 28 A) (rounded in *U. valiha*, Fig. 28 B). The females (Figs. 72 C, D) lack a median lobe or defined atrium from the epigynum and the vulva with a few, anteroposteriorly oriented, spermathecal loops; can be distinguished from those of similar *Uduba* (*U. valiha* and *U. fisheri*) species by having the lateral epigynal margins weakly convex (more convex in *U. valiha*, Figs. 72 G, 80 H and *U. fisheri*, Figs. 82 C–F), with a strong margin along the epigastric furrow (weak in *U. valiha*, Figs. 72 H, 82 F) and with the copulatory openings in the posterior part of plate (Fig. 72 C) at 0.31 of epigynum length (more anterior in *U. fisheri*, Fig. 72 E).

**Description.** **Male** (holotype): Total length 10.80. Markings typical for *Uduba*. Carapace 5.50 long, 3.60 wide, 1.90 high; clypeus 0.20 high. Eye diameters: AME 0.18, ALE and PME 0.20, PLE 0.22. Chelicerae 2.30 long; sternum 3.10 long, 2.30 wide; labium 1.40 long; palpal coxae 2.00 long. Divided cribellum. Spination: palpus–femur d1-1-1, p0-0-1, r0-0-1, tibia p1-0-0; leg I–femur d1-1-0-1, p0-0-2, r0-0-1-1, tibia d0-1-1-1, p0-1-1-0, v2-2-2-2, r0-1-1-0, metatarsus p1-1-1, v2-2-2-1, r1-0-1; leg II–femur d1-1-0-1, p0-1-0-1, r1-1-1-1, tibia d1-1-0-0, p0-1-1-0, v2-2-2-2, metatarsus p1-1-2, v2-2-1, r1-1-2; leg III–femur d1-1-1, p1-1-1-0, r1-1-1-0, patella p1, r1, tibia d1-0-1-0, p0-1-1-0, v2-2-2, r0-1-1-0, metatarsus p1-2-2, v2-2-2, r1-1-2; leg IV–femur d1-1-0-1, p1-1-0-1, r0-0-0-1, patella r1, tibia d1-0-1-0, p0-1-1-0, v2-2-2, r0-1-1-0, metatarsus p1-2-2, v1-2-2-1, r1-2-2. Scopulae: cymbium, apicodorsal; tarsi I–IV, weak, ventral. Leg measurements: I: 4.60 + 1.90 + 4.50 + 4.90 + 2.90 = 18.80; II: 4.30 + 1.80 + 3.80 + 4.00 + 2.30 = 16.20; III: 3.80 + 1.70 + 2.60 + 3.50 + 1.90 = 13.50; IV: 5.00 + 1.70 + 4.30 + 5.50 + 2.30 = 18.80; palpus: 2.10 + 0.70 + 0.80 + NA + 2.10 = 5.70. Leg formula 1=4, 23. **Male palp:** palpal tibia 0.42 cymbial length, RTA triangular, slightly curved, RTA length 0.30 tibia, with pointed apex, VTA triangular, length 0.32 tibia

width, UTA small; tibia with a long, slender prolateral spine (Fig. 44 A), without stout retrolateral spine (Fig. 44 C); tegulum with longitudinal, retromedian ridge, ridge beginning near tegulum base and extending for 0.70 tegulum length; TA3 a pointed spine, mostly hidden behind TA2, TA2 small, trapezoidal (Fig. 28 A); MA origin at 0.65 tegulum length, extends to tegulum apex, length (including apical processes) slightly less than width, length 0.30 tegulum width, deeply bifid MA (Figs. 28 A, 44B) with prolateral lobe slender, retrolateral lobe stout; conductor fan entire (Fig. 44 C). **Female** (paratype, CASENT9065679): Total length 12.00. Markings typical for *Uduba*. Carapace 5.10 long, 3.50 wide, 1.80 high; clypeus 0.30 high. Eye diameters: AME and ALE 0.16, PME 0.20, PLE 0.24. Chelicerae 2.50 long; sternum 2.30 long, 1.80 wide; labium 1.10 long; palpal coxae 1.70 long. **Ratios**—carapace length / width = 1.46, carapace height / width = 0.51, PER / carapace width = 0.42, PER / OAL = 3.04, PER / AER = 1.40, OAL / OQL = 1.20, OQP / OQA = 1.19, clypeus height / AME = 1.88, cheliceral length / clypeus height = 8.33, sternum length / width = 1.28, palpal coxa length / width = 2.43, femur I length / carapace width = 1.03, metatarsus I length / carapace width = 0.80, femur IV length / carapace width = 1.06, palpal tarsus length / carapace width = 0.46, palpal tarsus length / palpal patella length = 1.78, palpal tarsus length / palpal tibia length = 1.60, palpal tarsus length / palpal femur length = 0.94, palpal tibia length / palpal patella length = 1.11. Cribellum divided. Spination: palpus—femur d0-1-2, patella p1-0, tibia p2-2, tarsus p2-0-1, v0-0-1, r0-0-1; leg I—femur d1-0-1, p0-0-1, tibia v2-2-2-2, metatarsus p0-0-1, v2-2-2; leg II—femur d1-0-0, p0-0-1, tibia v1-1-1-2, metatarsus v2-2-3; leg III—femur d1-0-0-0, p0-1-0-1, r0-0-0-1, tibia d1-0-1-0, p0-1-1-0, v2-2-2, r0-1-1-0, metatarsus p1-1-1-2, v2-2-2, r1-1-2; leg IV—femur d1-1-0-0, p0-0-0-1, tibia p0-1-1-0, v2-2-2, metatarsus p0-1-1-2, v2-2-2, r1-2-1. Scopulae: ventral on tarsus and apical metatarsus I and II, tarsus III and IV. Leg measurements: I:  $3.60 + 1.80 + 3.00 + 2.80 + 1.80 = 13.00$ ; II:  $2.90 + 1.50 + 2.50 + 2.40 + 1.70 = 11.00$ ; III:  $2.80 + 1.30 + 1.70 + 2.20 + 1.50 = 9.50$ ; IV:  $3.70 + 1.50 + 3.10 + 3.70 + 2.00 = 14.00$ ; palpus:  $1.70 + 0.90 + 1.00 + \text{NA} + 1.60 = 5.20$ . Leg formula 4123. **Female genitalia**: epigynal plate without depressed atrium (Fig. 72 C), plate width 1.43 times length, lateral lobes with posterolateral edges and posteromedian longitudinal ridges on each side, width between bases of LL 0.68 times epigynum width, LL side width 0.16 times width epigynum; median lobe a flat plate, copulatory openings at mid-level of plate at 0.31 of epigynum length, distance between copulatory openings 0.42 times epigynum width. Vulva (Fig. 72 D), with spermathecal ducts forming 2-3 loose, longitudinal loops, vulva length 0.88 times width, fertilization ducts widely separated, vulva width 4.86 times distance between FD.

**Variation.** Male (N= 5): Total length 9.70–10.80; carapace length / width = 1.43–1.53, carapace height / width = 0.43–0.60, PER / carapace width = 0.34–0.35, PER / OAL = 2.42–2.54, PER / AER = 1.29–1.33, OAL / OQL = 1.09–1.25, OQP / OQA = 1.14–1.26, clypeus height / AME = 1.11–1.88, cheliceral length / clypeus height = 8.40–12.50, sternum length / width = 1.30–1.41, palpal coxa length / width = 2.50–3.00, femur I length / carapace width = 1.22–1.29, metatarsus I length / carapace width = 1.23–1.36, femur IV length / carapace width = 1.29–1.43, cymbium length / carapace width = 0.58–0.60, cymbium length / palpal patella length = 2.50–3.00, cymbium length / palpal tibia length = 2.33–2.63, cymbium length / palpal femur length = 1.00–1.05, palpal tibia length / palpal patella length = 1.00–1.14; palpal tibia length = 0.42–0.44 times cymbial length, RTA length 0.21–0.32 times tibia length, VTA length 0.19–0.32 times tibia width; tegulum longitudinal, retroapical ridge extending for 0.50–0.70 tegulum length, MA origin at 0.55–0.65 times tegulum length (Figs. 28 A, 44 A–C). Female variation unknown; only one female has been collected.

**Material examined.** MADAGASCAR: *Antananarivo Province*: Tsinjoarivo forest, Ankadi-vory, 19.71572°S, 47.82084°E, elev. 1385m, montane rainforest, pitfall traps, 26–29 August 2014,

B.L. Fisher *et al.*, [BLF 35410\_12] (Holotype, CASENT9065679, 1♂, CAS) and (paratype, CASENT9064772, 1♀, CAS), [BLF 35410\_5] (paratype, CASENT9065707, 1♂, CAS), [BLF 35410\_9] (paratype, CASENT9065595, 1♂, CAS), [BLF 35410\_10] (paratype, CASENT9065602, 1♂, CAS), [BLF 35410\_3] (paratype, CASENT9065698, 1♂, CAS).

**Natural history.** The species *Uduba hiragasy* occurs in montane rainforest. Both male and female specimens were collected in pitfall traps. The female has a developed cribellum and calamistrum, but it is unknown if the species wanders or makes retreats.

**Distribution.** The species *Uduba hiragasy* is known only from the type locality in rainforest on the eastern side of the escarpment in east-central Madagascar (Maps 10, 17).

### *Uduba ibonia*, new species

Figures 7 F, 9 E, 11 F, 20 B, 29 F, 45 A–C, 73 A, B, 81 C, F, Maps 1, 13.

**Type material.** Holotype male (CASENT9006038) from montane rainforest at 1100m elevation at 7 km W Ranomafana, ca. 21°12'S, 47°27'E, Fianarantsoa Province, Madagascar, collected 22–31 October 1988, W. Steiner, deposited in the USNM. Paratype female (CASENT9006035), from Parc National Ranomafana, Talatakely, 21°14.9'S, 47°25.6'E, Fianarantsoa Province, Madagascar, collected 11 April 1998 by D. Kavanaugh, deposited in CAS.

**Etymology.** The species epithet, *ibonia*, refers to an epic poem that has been told for at least several hundred years in various forms across the island of Madagascar; a noun in apposition.

**Diagnosis.** *Uduba ibonia* belong to Group I.a, the *Uduba dahli* group (Map 13) of Group I, the Epigynal atrium group. They are cribellate, with a very small divided cribellum (Fig. 20 B). Males can be distinguished from those of other cribellate *Uduba* by having the palpus with TA3 a slender, pointed screw (Fig. 29 F) and the TA2 an elongate blade (Figs. 29 F, 45 A, B). The females can be distinguished from those of other cribellate *Uduba* that have an epigynal plate with median lobe surrounded by depressed atrium by having the posterior margin of atrium divided at ML apex, atrium with atrial side plate (AtSp) next to ML (Fig. 73 B), ML short, broad, length about equal to width; *U. ibonia* females are distinguished from those of *U. platnicki* in that the former have a divided cribellum (Fig. 20 B), whereas *U. platnicki* are ecribellate.

**Description.** **Male** (Holotype). Total length 14.29. Markings as in Figs. 9 E, 11 F. Carapace 8.36 long, 6.07 wide, 2.50 high; clypeus 0.43 high. Eye diameters: AME 0.34, ALE 0.32, PME 0.36, PLE 0.43. Chelicerae 3.79 long; sternum 3.86 long, 2.93 wide; labium 1.82 long; palpal coxae 2.75 long. Cribellum divided, very small. Spination: palpus–femur d0-0-1, p0-0-1, r0-0-1, tibia p1-0; leg I–femur d1-1-0-1, p0-0-0-2, r0-0-0-1, tibia d0-0-0-1, p0-1-1-0, v2-2-2-2, r0-1-1-0, metatarsus p1-1-0, v2-2-3, r1-1-0; leg II–femur d1-1-0-1, p0-0-1, r0-1-0-1, tibia d0-0-0-1, p0-1-1-0, v2-2-2-2, r0-1-1-0, metatarsus p1-1-0, v2-2-3, r1-1-0; leg III–femur d1-1-1, p0-1-1-1, r0-1-1-0, tibia d0-0-1-0, p0-1-1-0, v2-0-2, r0-1-1-0, metatarsus p1-1-1-1, v2-2-2, r1-1-0-1; leg IV–femur d1-1-0-1, p0-1-0-1, r0-0-0-1, tibia d0-0-1-0, p0-1-1-0, v2-2-2, r0-1-1-0, metatarsus p1-1-2, v2-2-2, r2-1-2-1-2. Scopulae: cymbium, apicodorsal; strong beneath all tarsi. Leg measurements: I: 7.64 + 3.00 + 7.71 + 8.43 + 4.29 = 31.01; II: 7.00 + 2.86 + 6.36 + 7.21 + 3.79 = 27.21; III: 5.86 + 2.71 + 4.00 + 6.07 + 3.01 = 21.71; IV: 8.14 + 2.86 + 7.14 + 9.71 + 4.14 = 32.00; palpus: 3.14 + 1.29 + 1.43 + NA + 3.86 = 9.71. Leg formula 4123. **Male palp** (Ranomafana, CASENT9006036) (Figs. 45 A–C): palpal tibia 0.38 times cymbial length, RTA a short triangle (Fig. 45 A), length 0.21 tibia length, length 0.86 times width, with pointed apex, VTA conical, with broad base and slender apex (Fig. 45 B), length 0.31 tibia width, VTA length 1.60 times width; tibia with a long, slender prolateral spine but lacking stout spines; tegulum convex, without ridge, tegulum length 0.90 times width (Figs. 45 A, B), TA1 extends distad of tegulum apex, TA1 extends past TA3 apex by 1.285 times tegulum length; TA3 a slender, pointed screw, TA3 ends before TA2 apex, TA2 an elongate



triangular blade, visible behind and beyond TA3, apex rounded (Fig. 29 F); MA simple with small prolateral hook (Fig. 45 A), origin at 0.46 times tegulum length, tegulum apex at 0.29 tegulum length from MA apex, length (including apical processes) 0.78 times width, MA small (Figs. 45 A, C), length 0.20 tegulum length, width 0.23 tegulum width; conductor fan concave. **Female** (Paratype, CASENT9006035): Total length 12.50. Markings as in Fig. 7 F. Carapace 6.70 long, 5.50 wide, 2.50 high; clypeus 0.45 high. Eye diameters: AME and ALE 0.24, PME 0.22, PLE 0.26. Chelicerae 3.20 long; sternum 2.80 long, 2.30 wide; labium 1.50 long; palpal coxae 2.30 long. Cribellum divided, very small (Fig. 20 B). Spination: palpus–femur d0-0-2, patella p1, tibia p2-1, tarsus p2-1-1; leg I–femur d1-0-0-2, tibia v2-2-2-1, metatarsus v2-2-3; leg II–femur d1-0-0, p0-0-1, tibia v1-1-1-2, metatarsus v2-2-3; leg III–femur d0-0-0-1, p0-0-1-1, r0-0-1-1, tibia d0-1-0, p0-1-1-0, v2-0-2, r0-1-1-0, metatarsus p1-2-2, v2-2-2, r1-1-2, tarsus v0-1-0; leg IV–femur d1-1-0, r0-0-1, tibia v1-2-2, r0-1-1-0, metatarsus p1-1-0-2, v2-1-2-2, r1-2-1. Scopulae: strong ventral beneath all tarsi, beneath metatarsi I and II and apices of metatarsi III and IV. Leg measurements: I:  $4.70 + 2.30 + 3.90 + 3.70 + 2.30 = 16.90$ ; II:  $4.20 + 2.20 + 3.20 + 3.10 + 2.10 = 14.80$ ; III:  $3.40 + 1.90 + 2.00 + 2.80 + 1.90 = 12.00$ ; IV:  $4.80 + 2.00 + 3.80 + 4.90 + 2.40 = 17.90$ ; palpus:  $2.40 + 1.20 + 1.40 + \text{NA} + 2.30 = 7.30$ . Leg formula 4123. **Female genitalia** (Figs. 73 A, B, 81 C, F): epigynal plate with median lobe surrounded by depressed atrium, shallow beside ML and forming deep sulci laterally (Fig. 73 B), epigynal plate width 1.43 times length; atrium sides weakly concave, atrium width 1.87 times atrium length; epigynum length 1.79 times atrium length, atrium width 0.73 times epigynum width; atrium plate width at side of ML 0.18 times ML width (Fig. 81 C), atrium lateral sulcus width at side of ML 0.21 times ML width; atrium and median lobe arise well anterior of epigastric groove (Fig. 81 C), atrium origin at 0.26 of epigynal plate length, median lobe broad, widest at base, median lobe length 1.08 times width, ML does not extend to atrium apex, atrium extends 0.20 times epigynum length anterior of ML, ML length 0.38 times epigynal length; lateral lobes narrow, atrium width 7.30 times LL width; copulatory openings beneath the atrial side plate (*AtSp*) next to ML (Fig. 73 A), distance between CO 0.35 times width of epigynal plate, CO distance from epigastric furrow 0.64 times epigynum length. Vulva (Figs. 73 A, 81 F) with spermathecal ducts making three to four, transverse curves, vulva length 0.82 times width, fertilization ducts close-together, vulva width 8.80 times distance between fertilization ducts.

**Variation.** **Male** (N = 4): Total length = 11.43–14.29, carapace length / width = 1.38–1.53, carapace height / width = 0.45–0.59, PER / carapace width = 0.38–0.40, PER / OAL = 2.33–3.06, PER / AER = 1.32–1.42, OAL / OQL = 1.00–1.08, OQP / OQA = 1.13–1.28, clypeus height / AME diameter width = 1.26–1.56, cheliceral length / clypeus height = 6.58–8.91, sternum length / width = 1.24–1.31, palpal coxa length / width = 2.07–2.27, femur I length / carapace width = 1.26–1.39, metatarsus I length / carapace width = 1.39–1.55, femur IV length / carapace width = 1.34–1.59, cymbium length / carapace width = 0.63–0.85, cymbium length / palpal patella length = 2.99–3.87, cymbium length / palpal tibia length = 2.70–3.87, cymbium length / palpal femur length = 1.23–1.61, palpal tibia length / palpal patella length = 1.00–1.11. **Female** (N = 2): Total length = 11.80–14.50, carapace length / width = 1.38–1.53, carapace height / width = 0.41–0.67, PER / carapace width = 0.44–0.68, PER / OAL = 2.82–3.56, PER / AER = 1.36–1.44, OAL / OQL = 1.00–1.10, OQP / OQA = 1.17–1.28, clypeus height / AME = 1.26–2.55, cheliceral length / clypeus height = 7.11–8.83, sternum length / width = 1.22–1.32, palpal coxa length / width = 1.89–2.26, femur I length / carapace width = 1.00–1.04, metatarsus I length / carapace width = 0.80–0.82, femur IV length / carapace width = 1.00–1.08, palpal tarsus length / carapace width = 0.49–0.51, palpal tarsus length / palpal patella length = 1.80–1.92, palpal tarsus length / palpal tibia length = 1.60–1.71, palpal tarsus length / palpal femur length = 0.95–1.09, palpal tibia length / palpal patella length = 1.05–1.17. Genitalia as in Figs. 73 A, B, 81 C, F.

**Material examined.** MADAGASCAR: *Fianarantsoa Province*: 7 km W Ranomafana, ca. 21°12'S, 47°27'E, elev. 1100m, 22–31 October 1988, W. Steiner (holotype, CASENT9006038, 1♂, USNM), 8–21 October 1988, W. Steiner (CASENT9006037, 1♂, USNM), “island in stream; montane rainforest,” 1–7 November 1988, W. Steiner (CASENT9006036, 1♂, USNM); *Parc National de Ranomafana*, Vatoharanana, 4.0 km SW Ranomafana (ville), 21°14.7'S, 047°26.0'E, elev. 1025m, “pitfalls, slightly transitional lowland to lower montane rainforest”, 3–9 October 2000, S. Goodman [FMNH#00-225], (CASENT9064655, 2♂, FMNH), (CASENT9064664, 1♂, FMNH); *Parc National Ranomafana*, Talatakely, 21°14.9'S, 47°25.6'E, “walking on ground”, 11 April 1998, D. Kavanaugh (paratype, CASENT9006035, 1♀, CAS); Talatakely, 21°14.9'S, 47°25.6'E, elev. ca. 1200m, “under log”, 2 November 1998, V. F. Lee (CASENT9006034, 1♂, CAS); Talatakely, 21°15'S, 47°26'E, elev. ca. 915–1100m, 30 October–20 November 1998, V. F. Lee and K. Ribardo (CASENT9006033, 1♀, CAS).

**Natural history.** The species *Uduba ibonia* lives in lowland, premontane and montane rainforest. Collection records suggest that this species may wander; the presence of a calamistrum and a very small cribellum suggests some use of cribellate silk.

**Distribution.** Specimens of *Uduba ibonia* are known only from the vicinity of Ranomafana National Park in Fianarantsoa Province of southeastern Madagascar (Maps 1, 13).

### *Uduba ida*, new species

Figures. 73 C, F, Maps 5, 21.

**Type material.** Holotype female (CASENT9042534) from sifted litter in montane rainforest at 980m elevation in Station Forestière Analamazaotra (18°23'05"S, 048°24'46"E), Toamasina Province, Madagascar, collected 11–13 December 2007 by Brian L. Fisher, deposited in CAS.

**Etymology.** The species name honors Mrs. Ida George Meikle, mother-in-law of Charles Griswold. The name memorializes her for her encouragement and appreciation of all things natural and arachnological.

**Diagnosis.** *Uduba ida* are an Unclassified species (Map 21) with a divided cribellum. Females of *Uduba ida* can be distinguished from those of other *Uduba* species by their unique female genitalia: the epigynal plate (Fig. 73 C) is trapezoidal, narrowed anteriorly, with no distinction between ML and LL and with a strongly marked posterior margin at the epigastric furrow and copulatory openings exposed near the posterior margin of plate; vulva (Fig. 73 F) with spermathecal ducts forming five tight transverse loops in a longitudinal stack, duct returns posteriad within these loops, vulva length 1.30 times width. Males unknown.

**Description.** **Male:** Unknown. **Female** (Holotype): Total length 7.60. Markings typical for *Uduba*. Carapace 3.40 long, 2.45 wide, 1.50 high; clypeus 0.15 high. Eye diameters: AME 0.12, ALE 0.15, PME 0.16, PLE 0.18. Chelicerae 1.80 long; sternum 1.60 long, 1.40 wide; labium 0.80 long; palpal coxae 1.25 long. **Ratios**—carapace length / width = 1.39, carapace height / width = 0.61, PER / carapace width = 0.47, PER/OAL = 2.85, PER/AER = 1.36, OAL/OQL = 1.25, OQP/OQA = 1.33, clypeus height / AME = 1.25, cheliceral length / clypeus height = 12.00, sternum length / width = 1.14, palpal coxa length / width = 2.50, femur I length / carapace width = 1.02, metatarsus I length / carapace width = 0.78, femur IV length / carapace width = 1.02, palpal tarsus length / carapace width = 0.41, palpal tibia length / palpal patella length = 1.67, palpal tarsus length / palpal tibia length = 1.43, palpal tarsus length / palpal femur length = 0.83, palpal tibia length / palpal patella length = 1.17. Cribellum divided. Spination: palpus—femur d0-1-2, tibia p2-1, tarsus p2-1; leg I—femur d1-0-0, p0-0-1, tibia v2-2-2-2, metatarsus p0-0-1, v2-2-2; leg II—femur d1-0-0, p0-0-1, tibia p0-0-1, v1-1-1-2, metatarsus p0-0-1, v2-2-2; leg III—femur d1-0-0-1, p0-0-0-1, tibia d0-1-0, p0-1-1-0, v2-2-2, r0-1-1-0, metatarsus d0-1-0-0, p1-1-2, v2-2-2, r1-1-2; leg IV—femur

d1-0-0, tibia v2-2-2, metatarsus p0-1-2, v2-2-2, r1-1-2. Scopulae: weak ventral beneath tarsi I and II. Leg measurements: I:  $2.50 + 1.10 + 1.90 + 1.90 + 1.30 = 8.70$ ; II:  $2.10 + 1.10 + 1.60 + 1.60 + 1.20 = 7.60$ ; III:  $2.30 + 0.80 + 1.10 + 1.20 + 1.00 = 6.40$ ; IV:  $2.50 + 1.00 + 1.90 + 2.30 + 1.30 = 9.00$ ; palpus:  $1.20 + 0.60 + 0.70 + \text{NA} + 1.00 = 3.50$ . Leg formula 4123. **Female genitalia:** epigynal plate (Fig. 73 C) without depressed atrium, trapezoidal, narrowed anteriorly, no distinction between ML and LL, epigynal plate width 1.11 times length, with strongly marked posterior margin at epigastric furrow and copulatory openings exposed near posterior margin of plate; distance between copulatory openings 0.46 times epigynum width, CO origin at 0.15 of epigynum length, extant of plate laterad to copulatory openings equals 0.125 times plate width. Vulva unique (Fig. 73 F) with spermathecal ducts forming five tight transverse loops in longitudinal stack, duct returns posteriad within these loops, vulva length 1.30 times width, fertilization ducts widely spaced, vulva width 3.64 times distance between fertilization ducts.

**Variation.** Unknown: no males have been examined and only the unique holotype female is known.

**Material examined.** MADAGASCAR: *Toamasina Province*: Station Forestière Analamazotra, 18°23'05"S, 048°24'46"E, elev. 980m, sifted litter in montane rainforest, 1–13 December 2007, B. L. Fisher (Holotype, CAsENT9042534, 1♀, CAS).

**Natural history.** The unique specimen of the cribellate species *Uduba ida* was found in montane rainforest leaf litter.

**Distribution.** *Uduba ida* are known only from the type locality in east central Madagascar (Maps 5, 21), near the town of Périnet, which is an area renowned in Madagascar for species richness and endemism.

### *Uduba irwini*, new species

Figures 46 A–C, 71 C, D, Maps 3, 18.

**Type material.** Holotype male (CAsENT9062802) collected from malaise trap in *Uapaca* forest at 1700 m elevation in the Ankokoy Forest (20°04.05'S, 46°59.97'E), 3 km E of Ibity, Antananarivo Province, Madagascar, 12–22 January 2009, collectors M. Irwin and R. Harin'Hala, deposited in CAS. Paratype female (CAsENT9009383) collected at 150m elevation in tropical dry forest on tsingy from Parc National Tsingy de Bemaraha, 10.6 km 123°ESE Antsalova (19°42'34"S, 44°43'05"E), collected 16–20 November 2001 by the Fisher-Griswold Arthropod Team [BLF4503], deposited in CAS.

**Remarks.** Males of the similar species *Uduba rinha* and *Uduba irwini* may be distinguished by the TA2 form. Association of the males and females of *Uduba rinha* is unproblematic in that several were collected together at Parc National de Namoroka. Females associated with *Uduba rinha* have the epigynal plate posterior of the ML smooth or grooved and the CO hidden beneath the ML hood (Figs. 71 G, 81 B) whereas a female from Tsingy de Bemaraha (CAsENT9009383) differs from these in that it has exposed copulatory openings just behind the ML (Fig. 71 C). This female is considered a paratype of *Uduba irwini*, which is otherwise known only from males.

**Etymology.** The species epithet is a patronym on honor of Dr. Mike Irwin, entomologist and philanthropist and a principal architect of the malaise trap survey of Madagascar arthropods, which revealed many new species of spiders.

**Diagnosis.** *Uduba irwini* are members of Group IV, the *Uduba rinha* group (Map 18). They have a divided cribellum. Males can be distinguished from those of other *Uduba* except *Uduba rinha* by the simple, trapezoidal MA (Figs 46 A–C); *Uduba irwini* may be distinguished from *Uduba rinha* by having the TA2 an erect, rectangular spike (Fig. 46 B) (*Uduba rinha* has the TA2 a flexible hook or curlicue, Fig. 59 B). The females (Fig. 71 C) and *Uduba rinha* (Fig. 71 G) can

be distinguished from those of other cribellate *Uduba* by having the epigynum lateral lobes fused medially; the lone female of *Uduba irwini* has the copulatory openings exposed just posteriad of the ML (Fig. 71 C) whereas the females of *Uduba rinha* have the copulatory openings that are each hidden beneath the sides of the ML (Fig. 71 G).

**Description. Male** (Holotype): Total length 9.70. Markings typical of *Uduba*. Carapace 5.50 long, 3.60 wide, 2.10 high; clypeus 0.30 high. Eye diameters: AME 0.14, ALE 0.16, PME 0.18, PLE 0.20. Chelicerae 2.30 long; sternum 2.40 long, 1.80 wide; labium 1.10 long; palpal coxae 1.60 long. Cribellum divided. Spination. (ANJA reserve, CASENT9065405) palpus–femur d1-0-3; leg I–femur d1-1-1, p0-1-2, r0-1-1-0, tibia d0-1-1, p0-1-1-0, v2-2-2, r0-1-1-0, metatarsus d0-1-0, p0-1-2, v2-2-1, r1-1-1; leg II–femur d1-1-1, p0-1-2, r0-1-0-0, tibia d0-1-1-0, p0-1-1-0, v2-2-2, r0-1-1-0, metatarsus p1-1-2, v2-2-1, r1-1-2; leg III–femur d1-1-1, p0-1-0-2, r0-1-0-2, tibia d0-1-0, p0-1-1-0, v2-1-2, r0-1-1-0, metatarsus p1-1-2, v2-2-2, r1-1-2, tarsus v0-1-0; leg IV–femur d1-1-1, p0-1-1-0, r0-0-0-1, patella r1, tibia d1-0-1-0, p0-1-1-0, v2-2-2, r0-1-1-0, metatarsus d0-1-0, p1-1-2, v2-1-2-2, r1-1-2. Scopulae: cymbium, apicodorsal; tarsi I–IV, ventral. Leg measurements (holotype): I:  $4.40 + 1.90 + 4.00 + 4.10 + 2.60 = 17.00$ ; II:  $3.90 + 1.80 + 3.20 + 3.40 + 2.20 = 14.50$ ; III:  $3.40 + 1.50 + 2.10 + 2.70 + 1.70 = 11.40$ ; IV:  $4.20 + 1.70 + 3.80 + 4.20 + 2.40 = 16.30$ ; palpus:  $2.00 + 0.70 + 0.80 + \text{NA} + 2.50 = 6.00$ . Leg formula 1423. **Male palp** (ANJA Reserve, CASENT9065405) (Figs. 46 A–C): palpal tibia 0.35 cymbial length, RTA long, straight (Fig. 46 C), RTA length 0.33 times tibia length, length 2.25 times width, with sharply-pointed apex, VTA short, length 1.50 times width, conical, blunt (Figs. 46 A, C), length 0.52 times tibia width; tibia without stout spines; tegulum convex, without ridge, tegulum length 1.09 times width; TA1 slender, extends far distad of tegulum apex, TA1 extends past TA3 apex by 1.38 times tegulum length; TA3 a transverse, blunt hook (Fig. 46 B), TA3 extends apicad of TA2 by 1.21 times tegulum length, TA2 a small, erect trapezoid with concave apex, stiff, sclerotized, extends partially in front of TA3 (Fig. 46 B); MA a broad, flat trapezoid, origin at 0.54 times tegulum length, extends nearly to tegulum apex, tegulum apex at 0.085 tegulum length from MA apex, MA length (including apical processes) 1.22 times width, MA large (but smaller than in *U. rinha*, Fig. 59 A), length 0.31 tegulum length, width 0.29 tegulum width (Figs. 46 A–C); conductor fan elongate, entire (Fig. 46 C). **Female** (Paratype): Total length 11.56. Markings typical for *Uduba*. Carapace 5.60 long, 3.80 wide, 2.30 high; clypeus 0.30 high. Eye diameters: AME 0.16, ALE and PME 0.22, PLE 0.24. Chelicerae 2.70 long; sternum 2.40 long, 1.90 wide; labium 1.30 long; palpal coxae 1.90 long. **Ratios**—carapace length / width = 1.47, carapace height / width = 0.61, PER / carapace width = 0.42, PER / OAL = 3.20, PER / AER = 1.36, OAL / OQL = 1.09, OQP / OQA = 1.38, clypeus height / AME diameter width = 1.88, cheliceral length / clypeus height = 9.00, sternum length / width = 1.26, palpal coxa length / width = 2.38, femur I length / carapace width = 1.00, metatarsus I length / carapace width = 0.79, femur IV length / carapace width = 1.03, palpal tarsus length / carapace width = 0.45, palpal tarsus length / palpal femur length = 0.89. Cribellum divided. Spination: Palpus–femur d0-1-2, patella p1, tibia p2-0, tarsus p2-0, v0-0-2; leg I–femur d1-0-0, p0-0-1, tibia v2-2-2, metatarsus v2-2-3; leg II–femur d1-0-0, p0-0-1, tibia p0-0-1, v1-1-2, metatarsus v2-2-3; leg III–femur p0-1-0-0, r0-1-0-0, tibia d1-0-1-0, p0-1-1-0, v1-0-2, r0-1-1-0, metatarsus p1-2-2, v2-2-2, r1-1-2, tarsus v0-1-0; leg IV–femur d1-1-0-0-0, tibia v2-1-2, r0-1-1-0, metatarsus p0-1-2, v1-2-2, r0-2-2. Scopulae: strong ventral on all tarsi, most of metatarsi I and II, and apices of tarsi III and IV. Leg measurements: I:  $3.80 + 1.90 + 3.30 + 3.00 + 1.90 = 13.90$ ; II:  $3.20 + 1.60 + 2.60 + 2.30 + 1.80 = 11.50$ ; III:  $2.60 + 1.50 + 1.30 + 2.10 + 1.40 = 8.90$ ; IV:  $3.90 + 1.80 + 2.90 + 3.40 + 1.70 = 13.70$ ; palpus:  $1.90 + 1.00 + 1.00 + \text{NA} + 1.70 = 5.69$ . Leg formula 1423. **Female genitalia** (Figs. 71 C, D): epigynal plate without depressed atrium, plate width 1.35 times length; median lobe and lateral lobes differentiated only in anterior half of plate, distance

from posterior margin of ML to epigastric furrow 0.35 times epigynum length; median lobe a flat plate with lateral margins extending around to posterior, broad, median lobe width 0.63 times epigynum width, 0.45 times ML length, ML width 2.64 times LL width at sides of ML (Fig. 71 C); with copulatory openings exposed on epigynal plate beneath a transverse, crescentic groove on each side just behind ML, distance between copulatory openings 0.26 times epigynum width, CO origin at 0.35 of epigynum length. Vulva (Fig. 71 D) with spermathecal ducts forming three longitudinal loops, vulva length 0.64 times width, fertilization ducts widely separated, vulva width 3.57 times distance between FD.

**Variation.** Male (N= 7): Total length 9.70–11.50; carapace length / width = 1.33–1.53, carapace height / width = 0.40–0.59, PER / carapace width = 0.34–0.38, PER / OAL = 2.50–3.24, PER / AER = 1.37–1.42, OAL / OQL = 1.05–1.26, OQP / OQA = 1.18–1.25, clypeus height / AME 1.11–2.14, cheliceral length / clypeus height = 7.67–11.00, sternum length / width = 1.25–1.39, palpal coxa length / width = 2.25–2.67, femur I length / carapace width = 1.12–1.24, metatarsus I length / carapace width = 1.09–1.28, femur IV length / carapace width = 1.15–1.26, palpal tarsus length / carapace width = 0.64–0.74, palpal tarsus length / palpal patella length = 3.33–3.75, palpal tarsus length / palpal tibia length = 3.00–3.38, palpal tarsus length / palpal femur length = 1.17–1.33, palpal tibia length / palpal patella length = 1.00–1.25. Female variation is unknown: only one female, the paratype (CASENT9009383), is recognized.

**Material examined.** MADAGASCAR: *Antananarivo Province*: Antananarivo Province, Ankoko Forest, 3 km E of Ibity, 20°04.05'S, 46°59.97'E, elev. 1700m, malaise, in *Uapaca* forest, 12–22 January 2009, M. Irwin and R. Harin'Hala [MG-56-08] (holotype, CASENT9062802, 1♂, CAS); Réserve Spéciale d'Ambositantely, 24 km NE Ankazobe, 18°10.1'S, 47°16.6'E, elev. 1450m, disturbed transitional montane mossy forest, 30-hectare parcel, pitfall traps #1–3, 7–12 December 1997, S. Goodman (CASENT9016347, 1♂, FMNH), (CASENT9016348, 1♂, FMNH), (CASENT9006222, 1♂, FMNH), (CASENT9016346, 1♂, FMNH), (CASENT9016349, 3♂, FMNH). *Fianarantsoa Province*: Haute Matsiatra Region, ANJA Reserve, 61 km S Ambalavao, 13 km S of Fianarantsoa, 22°43.23'S, 46°15.47'E, elev. 1097m, malaise, isleberg vegetation, 10–19 December 2014, M. Irwin and R. Harin'Hala [MG-64B-95] (CASENT9065491, 1♂, CAS), 5–19 December 2013, M. Irwin and R. Harin'Hala [MG-64B-63] (CASENT9065405, 1♂, CAS). *Mahajanga Province*: Parc National Tsingy de Bemaraha, 10.6 km ESE 123° Antsalova, 19°42'34"S, 44°43'5"E, elev. 150m, tropical dry forest on tsingy, general collecting beating and puffing spiders, 16–20 November 2001, Fisher-Griswold Arthropod Team [BLF4503] (paratype, CASENT9009383, 1♀, CAS). *Toliara Province*: Forêt d'Analavelona, near source of Manasy River, 16.5 km NW d'Andranoheza, 22°38.6'S, 044°10.3'E, elev. 1250m, undisturbed mid-elevation forest w/dry and humid elements, pitfall, 2–8 November 2000, S. Goodman, [FMHD#00-224] (CASENT9062273, 1♂, FMNH), (CASENT9062271, 4♂, FMNH), (CASENT9062272, 1♂, FMNH).

**Natural history.** Except for a series of males collected in disturbed transitional montane mossy forest at Réserve Spéciale d'Ambositantely, other collections for *Uduba irwini* are from dry habitats including in *Uapaca* forest, on inselbergs and in tsingy. Females of *Uduba irwini* are cribellate and may produce sticky silk, though the collecting data that state "general collecting..." reveal nothing of burrows or retreats. As is typical of male *Uduba*, these were collected wandering on the ground and in the vegetation.

**Distribution.** The species *Uduba irwini* is recorded on the west side of the great escarpment across the southern half of Madagascar on the high plateau and western dry forests (Maps 3, 18).



*Uduba jayjay*, new species

Figures 5 C, F, 70 C, F, Maps 1, 20.

**Type material.** Holotype female (CASENT9004079) collected in montane rainforest at 1300m elevation at 3 km 41°NE Andranomay, 11.5 km 147°SSE Anjozorobe, 18°28'24"S, 47°57'36"E, Antananarivo Province, Madagascar, collected 5–13 December 2000 by the Fisher-Griswold Arthropod Team [BLF2543] deposited in CAS.

**Etymology.** The species epithet is an honor to Mr. Jean-Jacques Rafanomezantsoa, sometimes called "JJ", a Malagasy entomologist, Lakeside International Scholar at the California Academy of Sciences, and principal arachnid collector with the Fisher-Griswold Arthropod Survey of Madagascar (2000–2007). As a rugged and resourceful field biologist and essential member of the Fisher-Griswold Arthropod Team, Jean-Jacques Rafanomezantsoa is collector of many new and interesting arthropods from Madagascar.

**Diagnosis.** *Uduba jayjay* are members of Group VI, the *Uduba danielae* group (Map 20). Females can be distinguished from those of other *Uduba* with a divided cribellum by the form of the female genitalia (Figs. 70 C, F). *Uduba jayjay* are distinguished from *U. danielae* by having the median lobe trapezoidal, broader posteriorly (Fig. 70 C), lateral margins strongly convex (*U. danielae* with median lobe bell-shaped, broader posteriorly, sides gently curved, Fig. 70 A) and the vulva (Fig. 70 F) with spermathecal ducts beginning anteromedially, forming gentle outside curve to vulva base, then entering at apex of BS bulb (*U. danielae* with spermathecal ducts beginning anteromedially and forming Z-shaped path, lateral, medial, lateral, to posterior, Fig. 70 B). Male unknown.

**Description.** **Male:** Unknown. **Female** (Holotype): Total length 6.30. Markings as in Figs. 5 C, F. Carapace 3.30 long, 2.20 wide, 1.00 high; clypeus 0.15 high. Eye diameters: AME 0.08, ALE 0.14, PME 0.13, PLE 0.16. Chelicerae 1.50 long; sternum 1.55 long, 1.20 wide; labium 0.70 long; palpal coxae 1.00 long. **Ratios**—carapace length / width = 1.50, carapace height / width = 0.45, PER / carapace width = 0.41, PER / OAL = 3.00, PER / AER = 1.29, OAL / OQL = 1.15, OQP / OQA = 1.23, clypeus height / AME diameter width = 1.88, cheliceral length / clypeus height = 10.00, sternum length / width = 1.29, palpal coxa length / width = 2.50, femur I length / carapace width = 0.95, metatarsus I length / carapace width = 1.18, femur IV length / carapace width = 1.09, palpal tarsus length / carapace width = 0.41, palpal tibia length / palpal patella length = 1.50, palpal tarsus length / palpal tibia length = 1.80, palpal tarsus length / palpal femur length = 0.75, palpal tibia length / palpal patella length = 0.83. Cribellum divided. Spination: palpus—femur d0-1-2, patella p1-0, tibia p2-1, tarsus p2-1; leg I—femur d0-1-0, p0-0-1, tibia v1-1-2-0, metatarsus v2-2-2; leg II—femur p0-0-1, tibia v1-1-1 (retro), metatarsus v2-2-3; leg III—femur d1-0-0, p0-0-1, r0-0-1, tibia d0-1-0, p0-1-1-0, v2-2-2, r0-1-1-0, metatarsus p1-2-2, v2-2-2, r1-1-2; leg IV—femur d1-0-0, tibia v2-2-2, metatarsus p1-2-2, v2-2-2, r0-2-2. Scopulae: ventral on tarsi I and II. Leg measurements: I: 2.10 + 1.20 + 1.80 + 2.60 + 1.30 = 9.00; II: 2.00 + 1.10 + 1.40 + 1.35 + 1.10 = 6.95; III: 1.60 + 0.80 + 0.90 + 1.30 + 0.90 = 5.50; IV: 2.40 + 1.00 + 1.90 + 2.20 + 1.30 = 8.80; palpus: 1.20 + 0.60 + 0.50 + NA + 0.90 = 3.20. Leg formula 1423. **Female genitalia:** epigynal plate without depressed atrium, median and lateral lobes indistinct (Fig. 70 C), plate width 1.48 times length; width between bases of LL 0.52 times epigynum width; LL side width 0.19 epigynal plate width; median lobe trapezoidal, broader posteriorly, lateral margins strongly convex, length 0.62 times epigynum length; copulatory openings beneath anterior margin of obliquely transverse grooves, origin at 0.48 epigynum length, distance between CO 0.26 times epigynum width. Vulva (Fig. 70 F) with spermathecal ducts beginning anteromedially, forming gentle outside curve to vulva base, then entering at apex of BS bulb, vulva length 0.60 times width, fertilization ducts separated, vulva width 4.17 times distance between FD.

**Variation.** Unknown: only the holotype female is known.

**Material examined.** MADAGASCAR: *Antananarivo Province*: 3 km 41°NE Andranomay, 11.5 km 147°SSE Anjozorobe, 18°28'24"S, 47°57'36"E, elev. 1300m, general collecting –montane rainforest, 5–13 December 2000, Fisher-Griswold Arthropod Team [BLF2543] (Holotype, CASENT9004079, 1♀, CAS).

**Natural history.** The holotype female of the cribellate *Uduba jayjay* was collected in montane rainforest.

**Distribution.** *Uduba jayjay* are known only from the type locality in montane rainforest in central east Antananarivo Province, Madagascar (Maps 1, 20).

### *Uduba kavanaughi*, new species

Figures 1 A–E, 7 I, 9 G, 28 F, 47 A–C, 76 D, E, Maps 9, 13.

*Uduba* sp. CG301 Wheeler et al. (2017: fig. 6), DNA voucher.

**Type material.** Holotype male (CASENT9029870) from evergreen forest at 970m elevation in Parc National Ranomafana, 21°15'50.6"S, 47°25'9.6"E, Fianarantsoa Province, Madagascar, collected 11–12 January 2009, C. Griswold (CGM01), deposited in CAS. Two paratype females (CASENT9003516) and (CASENT9003517), both from mixed tropical forest at 900m elevation in Ranomafana National Park, 21.25041°S, 47.41945°E, collected 2–22 January 2001 by D. H. and K. M. Kavanaugh, R. L. Brett, E. Elsom and F. Vargas, and one paratype male (CASENT9031127) from Talatakely, 1.68 km SW Ranomafana, elev. 970m, 21°15'50.6"S, 47°9.6"E, collected 11–12 January 2009 by C. Griswold, A. Saucedo and H. Wood, all deposited in CAS.

**Etymology.** The species epithet is a patronym in honor of Dr. David H. Kavanaugh, Coleoptera curator and natural history explorer from the California Academy of Sciences, who dauntlessly pursued and collected this species as well as other *Uduba*.

**Note.** In the phylogeny publication by Wheeler *et al.* (2017) a voucher specimen of this species was included and listed as *Uduba* sp. CG301 “big red juvenile” (Wheeler et al., 2017:fig. 6), DNA voucher, with the following collection data: “Talatakely forest, 42.3 km 58° NE Fianarantsoa, S21°15'28.0", E47°25'21.8", elev. 1050m, montane rainforest, general collecting, 24 December 2005 to 14 January 2006, H. Wood, J. Miller, J.J. Rafanomezantsoa, E. Rajeriarison, V. Andriamananona, [HW009] [DNA-MAD-111] 1j, (CASENT9024063, 1 juvenile, CAS)”.

**Diagnosis.** *Uduba kavanaughi* are members of Group I.a, the *Uduba dahli* group (Map 13) of Group I, the Epigynal atrium group. They are ecribellate and very large, with males greater than 22mm, females greater than 30mm total length. Males can be distinguished from those of other *Uduba* with a screw shaped TA3 by having the TA2 that is hidden ventrally behind TA3 (Figs. 47 A–C) and are distinguished from *Uduba platnicki* by having the TA2 formed as a small, blunt blade with a median longitudinal ridge (Fig. 28 F) (in *Uduba platnicki* the TA2 a small, simple mound, lacking such a ridge, Fig. 28 E). Females can be distinguished from those of other ecribellate *Uduba* that have an epigynal plate with median lobe surrounded by depressed atrium (Figs. 76 D, E) by having the plate short or nearly absent posteriad of atrium, height less than 0.12 times epigynal length, lateral lobes meet behind atrium to form short posterior plate, equal to 0.08–0.12 times epigynum length, median lobe short and broad, width atrium less than 3 times ML width, ML length less than 1.50 times width, atrium a broad depression on each side of ML; CO (Figs. 76 D, E) appear to be beneath the ML (as in *U. halabe*, Figs. 74 C, F), but *U. halabe* has an entire cribellum (Fig. 20 A) whereas *U. kavanaughi* is ecribellate.

**Description. Male** (Holotype): Total length 24.00. Markings as in Figs. 1 A–B, 9 G, body and legs to patellae dark, tibiae to tarsi segments light. Carapace 13.80 long, 10.60 wide, 8.00 high;

clypeus 3.60 high. Eye diameters: AME 0.50, ALE and PME 0.56, PLE 0.52. Chelicerae 18.00 long; sternum 14.20 long, 11.80 wide; labium 8.00 long; palpal coxae 11.50 long. With a colulus. Spination (paratype, CASENT9031127): palpus—femur d0-0-1, p0-0-1, r0-0-1; leg I—femur d1-0-1-0, p0-0-1, r0-0-1, tibia d0-0-0-1, p0-1-1-0, v2-2-2-2, r0-1-1-0, metatarsus p1-0-0, v2-1-3, r1-0-0; leg II—femur d1-1-2, p0-1-1-0, r0-1-1-0, patella r1, tibia d0-1-1-0, p0-1-1-0, v2-2-2-2, r0-1-1-0, metatarsus p1-1-1, v1-1-2, r1-0-0; leg III—femur d1-1-0-1, p0-1-0-1-1, r0-1-0-1-1, tibia d0-0-1-0, p0-1-1-0, v2-2-2, r0-1-1-0, metatarsus p1-2-2, v2-2-2, r1-2-2, tarsus v0-1-0; leg IV—femur d1-1-1-0-1, p0-1-0-1, r0-0-0-1, tibia d0-0-0-1, p0-1-1-0, v2-1-2-0, r0-1-1-0, metatarsus p0-1-2, v1-1-1-2, r0-1-1-1. Scopulae: cymbium, apicodorsal; beneath all tarsi, metatarsi I and II, and apices of metatarsi III and IV. Leg measurements [holotype]: I:  $15.00 + 6.00 + 13.00 + 15.00 + 7.00 = 56.00$ ; II:  $14.50 + 5.50 + 10.00 + 13.00 + 2.50 = 48.50$ ; III:  $10.10 + 4.50 + 7.00 + 11.00 + 4.00 = 36.50$ ; IV:  $14.00 + 4.50 + 11.00 + 17.20 + 6.50 = 53.20$ ; palpus:  $9.00 + 2.20 + 2.10 + \text{NA} + 8.30 = 21.60$ . Leg formula 1423. **Male palp** (holotype, Figs. 47 A–C): palpal tibia 0.34 times cymbial length, RTA conical, length 0.16 tibia length, length 0.56 times width, with bluntly pointed apex (Fig. 47 B); VTA conical, length 1.25 times width, length 0.31 tibia width; tibia lacking stout spines; tegulum convex, without ridge (Figs. 47 B, C), tegulum length 1.02 times width; TA1 extends distad of tegulum apex, TA1 extends past TA3 apex by 1.07 times tegulum length; TA3 a large, sharp-pointed screw, with proximal ridges (Figs. 47 B, C), TA3 extends apicad of TA2 by 1.15 times tegulum length, TA2 hidden behind apex of TA3, forming a small, blunt blade with a median longitudinal ridge (Fig. 28 F); MA simple, origin at 0.41 times tegulum length, tegulum apex at 0.34 tegulum length from MA apex, MA small (Figs. 47 B, C), length (including apical processes) 0.56 times width, width 0.37 tegulum width; conductor fan margin irregular (Fig. 47 C). **Female** (Paratype, CASENT9003516): Total length 31.00. Markings as in Figs. 1 C–E, 7 I, carapace and legs reddish in life. Carapace 16.00 long, 11.60 wide, 6.50 high; clypeus 1.40 high. Eye diameters: AME 0.40, ALE 0.48, PME 0.46, PLE 0.50. Chelicerae 7.80 long; sternum 6.50 long, 5.20 wide; labium 3.50 long; palpal coxae 5.40 long. With a colulus. Spination: Female (paratype, CASENT9003517): palpus—femur d1-0-3, patella p1, tibia p2-0, tarsus p2-1, v2-0; leg I—femur d0-1-0-1, p0-0-0-2, patella p1, v1, tibia p0-1-1-0, v2-1-2-2, metatarsus v2-2-1; leg II—femur d1-0-0-1, p0-1-0-2, r0-1-0-0, tibia p0-1-1-0, v2-2-2-2, metatarsus p0-1-1-0, v2-1-2-1; leg III—femur d1-1-0-1, p1-0-1-1, r1-0-1-1, tibia d1-0-0-0, p0-1-1-0, v2-2-3, r0-1-1-0, metatarsus p1-2-2, v2-2-2, r1-2-2, tarsus v0-1-0; leg IV—femur d0-1-0-1, p0-1-0-1, r0-0-0-1, tibia p0-1-1-0, v2-2-2, r0-1-1-0, metatarsus p1-1-1, v2-1-2-0, r2-2-1. Scopulae: strong ventral beneath all tarsi, beneath metatarsi I–III and apical half of metatarsus IV, and beneath apices of tibiae I and II. Leg measurements (Paratype, CASENT9003516): I:  $12.00 + 5.80 + 9.60 + 10.00 + 4.80 = 42.20$ ; II:  $10.30 + 5.30 + 8.00 + 8.50 + 4.50 = 36.60$ ; III:  $8.60 + 4.60 + 5.50 + 8.00 + 4.40 = 31.10$ ; IV:  $11.20 + 4.80 + 8.70 + 12.00 + 4.90 = 41.60$ ; palpus:  $6.00 + 3.10 + 3.50 + \text{NA} + 6.80 = 19.40$ . Leg formula 1423. **Female genitalia** (Paratype, CASENT9003517): epigynal plate with median lobe surrounded by depressed atrium (Fig. 76 D), plate width 1.50 times length; atrium sides evenly concave, atrium extends anteriad and posteriad of ML, width 1.425 times atrium length; epigynum length 1.75 times atrium length, epigynum width 1.84 times atrium width; atrium width at side of ML 0.46 times ML width; atrium ends just anteriad of epigastric groove, atrium origin at 0.09 of epigynal plate length, median lobe broad, notched apically and widest at base, median lobe length 1.27 times width, ML ends at atrium apex, ML length 0.49 times epigynal length; lateral lobes broad, atrium width 2.85 times LL width; copulatory openings appear to open beneath ML of atrium (Fig. 76 D). Vulva with spermathecal ducts making two large, transverse curves, vulva length 0.60 times width, vulva width 4.16 times distance between fertilization ducts (Fig. 76 E).

**Variation.** *Male* (N = 2): Total length = 24.00–26.00, carapace length / width = 1.30–1.37,

carapace height / width = 0.55–0.75, PER / carapace width = 0.35–0.35, PER / OAL = 2.82–2.86, PER / AER = 1.33–1.35, OAL / OQL = 1.16–1.35, OQP / OQA = 1.09–1.21, cheliceral length / clypeus height = 5.00–15.00, femur I length / carapace width = 1.29–1.42, metatarsus I length / carapace width = 1.33–1.43, femur IV length / carapace width = 1.23–1.32, cymbium length / carapace width = 0.62–0.78, cymbium length / palpal patella length = 2.83–3.77, cymbium length / palpal tibia length = 2.50–3.95, cymbium length / palpal femur length = 0.92–1.00, palpal tibia length / palpal patella length = 0.95–1.13. Male genitalia as in Figs. 28 F, 47 A–C. **Female** (N = 2): Total length = 31.00–37.00, carapace length / width = 1.38–1.52, carapace height / width = 0.56–0.57, PER / carapace width = 0.41–0.42, PER / OAL = 3.64–4.05, OAL / OQL = 1.00–1.02, OQP / OQA = 1.20–1.25, clypeus height / AME = 2.50–3.50, cheliceral length / clypeus height = 5.57–7.75, sternum length / width = 1.21–1.25, palpal coxa length / width = 2.35–2.39, femur I length / carapace width = 0.94–1.03, metatarsus I length / carapace width = 0.80–0.86, palpal tarsus length / carapace width = 0.49–0.59, palpal tarsus length / palpal patella length = 1.62–2.19, palpal tarsus length / palpal tibia length = 1.58–1.94, palpal tarsus length / palpal femur length = 1.00–1.13, palpal tibia length / palpal patella length = 1.03–1.13.

**Material examined.** MADAGASCAR: *Fianarantsoa Province*: Parc National Ranomafana, Talatakely, 1.68 km SW Ranomafana, 21°15'50.6"S, 47°25'9.6"E, elev. 970m, general collecting day and night, evergreen forest, 11–12 January 2009, C. Griswold (Holotype, CASENT9029870, 1♂, CAS), Talatakely area, elev. 900m, mixed tropical forest, 2–22 January 2001, 21.25041°S, 47.41945°E, D. H. Kavanaugh (paratype, CASENT9003516, 1♀, CAS), Talatakely area, 900m, mixed tropical forest, 2–22 January 2001, 21.25041°S, 47.41945°E, D. H. and K. M. Kavanaugh, R. L. Brett, E. Elsom, and F. Vargas (paratype, CASENT9003517, 1♀, 1 juv. ♂, CAS), Talatakely, 1.68 km SW Ranomafana, 21°15'50.6"S, 47°9.6"E, elev. 970m, general collecting day and night, evergreen forest, 11–12 January 2009, C. Griswold, A. Saucedo and H. Wood [CGM01] (paratype, CASENT9031127, 1♂, CAS), Talatakely forest, 42.3 km 58°NE Fianarantsoa, S21°15'28.0", E47°25'21.8", elev. 1050m, montane rainforest, general collecting, 24 December 2005–14 January 2006, H. Wood, J. Miller, J. J. Rafanomezantsoa, E. Rajeriarison, V. Andriamanananona, [HW009] [DNA-MAD-111] (CASENT9024063, 1 juvenile, CAS).

**Natural history.** The species *Uduba kavanaughi* has been collected in rainforest. Males and females of this large, ecribellate species have been found wandering at night. David Kavanaugh (pers. Comm.) reports that several females were found in burrows from which they emerged for short distances at night, and into which they quickly retreated when disturbed. These burrows never had any extended turrets or even evident silk atop or in any of these burrows.

**Distribution.** Specimens of *Uduba kavanaughi* are known only from the vicinity of Ranomafana Forest, in southeastern Madagascar (Maps 9, 13).

### *Uduba lakroa*, new species

Figures 48 A–C, Maps 12, 21.

**Type material.** Holotype male (CASENT9064782) from pitfall traps at 875 m elevation along Andrauorena River on the NE slope Mt. Papango in Parc National de Midousy, 23°50.1'S, 46°57.8'E, Fianarantsoa Prov., Madagascar, collected 26–31 October 2003 by L. E. Olsen [FMNHLEO128], deposited in FMNH. Three paratype males, same data, two deposited in FMNH (CASENT9062274 and CASENT9062280) and one in CAS (CASENT9062275).

**Etymology.** The species epithet is from a Malagasy word for cross, *lakroa*; a noun in apposition.

**Diagnosis.** *Uduba lakroa* are one of the Unclassified species (Map 21), which have a divided

cribellum. Males of *U. lakroa* can be distinguished from those of other *Uduba* by having the palpus with a swollen, dark lobe near the base of TA2 and swollen, unsclerotized lobe near the base of TA3 and the conductor (Figs. 48 A–C). Females are unknown.

**Description.** Male (Holotype): Total length 13.80. Markings typical of *Uduba*. Carapace 8.10 long, 5.60 wide, 3.40 high; clypeus 0.40 high. Eye diameters: AME 0.24, ALE 0.28, PME 0.26, PLE 0.28. Chelicerae 3.70 long; sternum 3.40 long, 2.60 wide; labium 1.70 long, 1.20 wide; palpal coxae 2.60 long, 1.00 wide. Cribellum divided. Spination (paratype, CASENT9062275): palpus–femur 1-1-0-1, p0-0-2, patella p0-1-0, tibia p1 [elongate, stout spine]-0-0; leg I–femur d1-1-1, p0-1-2, r0-1-1-1, patella p1, r1, tibia d0-1-1, p0-1-1-0, v2-2-2-2, r0-1-1-0, metatarsus p01-1-1, v2-2-2, r1-1-0; leg II–femur d1-1-1, p0-1-2, r1-1-1-1, patella p1, r1, tibia d1-1-1, p0-1-1-0, v2-1-2-2-2, r0-1-1-0, metatarsus p1-1-1, v2-2-2, r1-1-1; leg III–femur d1-0-1-1, patella p1, r1, tibia d1-1-1, p0-1-1-0, v2-2-2, r0-1-1-0, metatarsus p1-1-2, v2-2-2, r1-1-2; leg IV–femur d0-1-1-1, patella p1, r1, tibia d0-1-1, p0-1-1-0, v2-2-2, r0-1-1-0, metatarsus p1-1-2, v2-2-2, r1-1-2. Scopulae: cymbium, apicodorsal; tarsi I–IV, ventral. Leg measurements (combination of males CASENT9062274 and CASENT9062275): I:  $6.70 + 2.80 + 6.20 + 6.10 + 3.60 = 25.40$ ; II:  $6.00 + 2.70 + 5.40 + 5.60 + 3.20 = 22.90$ ; III:  $5.60 + 2.30 + 4.10 + 5.50 + 3.00 = 20.50$ ; IV:  $6.70 + 2.50 + 5.70 + 7.30 + 3.40 = 25.60$ ; palpus:  $3.00 + 1.10 + 1.10 + \text{NA} + 3.30 = 8.50$ . Leg formula 4123. **Male palp** (paratype, CASENT9062275): palpal tibia 0.30 cymbial length, RTA very broad (Fig. 48 C), RTA length 0.27 tibia length, length 0.57 times width, with blunt, curved apex, VTA small, slender, curved (Fig. 48 A), length 1.60 times width, length 0.33 tibia width; tibia with an elongate, stout prolateral spine; tegulum convex, without ridge (Figs. 48 B, C), tegulum length 0.92 times width; TA1 extends to tegulum apex and slightly past TA3 apex; TA3 and TA2 both thick, curved, TA2 crosses in front of TA3, TA3 extends apicad of TA2 by 1.05 times tegulum length (Fig. 48 B), MA transverse, bilobed, origin at 0.47 times tegulum length, tegulum apex at 0.32 tegulum length from MA apex, MA length (including apical processes) 0.72 times width, MA large but narrowly transverse (Figs. 48 B, C), length 0.28 tegulum length, width 0.35 tegulum width; conductor fan entire. **Female:** Unknown.

**Variation.** Male (N=4): Total length 13.00 to 14.50; ratios of carapace length / width = 1.40–1.48, carapace height / width = 0.49–0.61, PER / carapace width = 0.37–0.40, PER / OAL = 3.03–3.48, PER / AER = 1.32–1.39, OQP / OQA = 1.03–1.07, clypeal height / diameter AME = 1.25–1.67, cheliceral length / clypeal height = 9.25–12.33, sternum length / width = 1.31–1.46; length femur I / carapace width = 1.25–1.37, metatarsus I / carapace width = 1.07–1.27, femur IV length / carapace width = 1.26–1.35, cymbium length / carapace width = 0.58–0.63, palpal tibia length / palpal patella length = 0.83–1.00, cymbium length / palpal tibia length = 2.75–3.00, cymbium length / palpal femur length = 1.00–1.11. Female variation is unknown: only males are recognized.

**Material examined.** MADAGASCAR: *Fianarantsoa Province*: Parc National de Midousy, NE slope Mt. Papango, along Andrauorena River, 2 km SW Befotaka, 23°50.1'S, 46°57.8'E, elev. 875m, camp #1, pitfall trap line #3, 26–31 October 2003, L. E. Olsen, [FMNH #LEO128] (Holotype, CASENT9064782, 1♂, FMNH), (paratype, CASENT9062274, 1♂, FMNH), (paratype, CASENT9062280, 1♂, FMNH), (paratype, CASENT9062275, 1♂, CAS).

**Natural history.** The type locality is in a region of rainforest. Collection data reveal that males of the cribellate *Uduba lakroa* wander, as they were collected in pitfall traps.

**Distribution.** *Uduba lakroa* are known only from the type locality in far southeastern Madagascar (Maps 12, 21).



*Uduba lamba*, new species

Figures 9 H, 26 C, 49 A–C, Maps 12, 13.

**Type material.** Holotype male (CASENT9042542) from rainforest at 525m elevation, Réserve Nationale Intégrale Betampona, 17°55'11"S, 049°12'01"E, Toamasina Province, Madagascar, collected 25 May–1 June 2008 by B. L. Fisher, deposited in CAS. Paratype male (CASENT9042359), same data, also deposited in CAS.

**Etymology.** The species epithet, *lamba*, refers to a traditional garment worn by men and women in Madagascar; a noun in apposition.

**Diagnosis.** *Uduba lamba* are members of Group I.a, the *Uduba dahli* group (Map 13) of Group I, the Epigynal atrium group. They are ecribellate, with a colulus (Fig. 26 C). Males have the TA3 with a small, screw-shaped apex, TA2 erect, truncate, apex a sharp point, with a large, complex MA, concave in center with strong marginal ridge with a transverse ventral lobe or with ventral point to prolateral (Figs. 49 A–C); distinguished from *Uduba fandroana* and *U. hainteny* by having the MA relatively large, with pronounced ventral projection (Figs. 49 A–C): in *Uduba fandroana* (Figs. 39 A–C) and *U. hainteny* (Figs. 42 A–C) the MA is relatively small, width less than 0.35 tegulum width, height less than 0.25 tegulum height and without prominent projections. Female unknown.

**Description.** Male (holotype): Total length 12.50. Markings as in Fig. 9 H. Carapace 8.60 long, 5.70 wide, 2.80 high; clypeus 0.40 high. Eye diameters: AME and ALE 0.26, PME 0.28, PLE 0.36. Chelicerae 3.40 long; sternum 3.50 long, 2.80 wide; labium 2.20 long; palpal coxae 2.70 long. With a colulus (Fig. 26 C). Spination (holotype): palpus–femur d0-0-1, p0-0-1, r0-0-1; leg I–femur d1-1-1, p0-0-2, r0-0-1, tibia p0-1-1-0, v2-2-2-2, r0-1-0-0, metatarsus p1-1-0, v2-2-3, r1-1-0; leg II–femur d1-1-1, p0-1-1, r0-1-0-1, tibia d0-1-1-0, p0-1-1-0, v2-2-2-2, r0-1-1-0, metatarsus p1-1-0, v2-2-3, r1-1-0; leg III–femur d1-1-1, p0-1-1-1, r0-1-1-1, tibia d0-1-0, p0-1-1-0, v2-2-2, r0-1-1-0, metatarsus p1-1-1-2, v2-2-2, r1-1-2; leg IV–femur d1-1-0-1, p0-1-0-1, r0-0-0-1, tibia v2[segments missing from both sides]. Scopulae: cymbium, apicodorsal; weak beneath tarsi and apices of all metatarsi. Leg measurements (paratype, CASENT9042359): I:  $8.50 + 3.30 + 8.20 + 9.00 + 4.60 = 33.60$ ; II:  $7.20 + 2.70 + 6.70 + 7.20 + 3.90 = 27.70$ ; III:  $6.00 + 3.40 + 4.00 + 6.30 + 3.20 = 22.90$ ; IV [metatarsus and tarsus are missing, so their lengths and leg IV total length have been estimated]:  $8.40 + 3.60 + 7.10 + 9.14 + 4.03 = 32.27$ ; palpus:  $3.20 + 1.20 + 1.40 + \text{NA} + 4.00 = 9.80$ . Leg formula 1423. **Male palp** (holotype, Figs. 49 A–C): palpal tibia 0.40 times cymbial length, RTA short, triangular, with blunt apex (Fig. 49 C), RTA length 0.78 times width, RTA length 0.21 times tibia length; VTA slender, nearly cylindrical (Fig. 49 A), length 1.71 times width, length 0.40 times tibia width; tibia lacks stout spines; tegulum convex, without ridge but with retrolateral concavity (Fig. 49 B), tegulum length 1.08 times width; TA1 extends distad of tegulum apex, TA1 extends past TA3 apex by 1.36 times tegulum length; TA3 with a small, screw-shaped apex, TA3 even with TA2 apex, TA2 erect, truncate with apex a sharp point (Fig. 49 B); MA large, complex, length 0.31 tegulum length, width 0.435 tegulum width, MA origin at 0.36 tegulum length, tegulum apex at 0.48 tegulum length from tegulum apex, length (including apical processes) 0.76 times width (Figs. 49 A–C), MA with transverse ventral lobe; conductor fan concave or entire. **Female** unknown.

**Variation.** **Male** (N = 2) Total length = 12.50–14.29, carapace length / width = 1.40–1.51, carapace height / width = 0.41–0.49, PER / carapace width = 0.37–0.39, PER / OAL = 2.33–2.76, PER / AER = 1.33–1.37, OAL / OQL = 1.04–1.12, OQP / OQA = 1.05–1.08, clypeus height / AME = 1.25–1.54, chelicer length / clypeus height = 8.50–9.00, palpal coxa length / width = 2.45–2.70, femur I length / carapace width = 1.37–1.47, metatarsus I length / carapace width = 1.44–1.55, femur IV length / carapace width = 1.45–1.46, cymbium length / carapace width = 0.63–0.69, cymbium length / palpal patella length = 3.27–3.33, cymbium length / palpal tibia length = 2.86–3.00,

cymbium length / palpal femur length = 1.20–1.25, palpal tibia length / palpal patella length = 1.09–1.17. Female variation unknown.

**Material examined.** MADAGASCAR: *Antsiranana Province*: 6.5 km SSW Befingotra, Rés. Anjanaharibe-Sud, 14°45'S; 49°30'E, elev. 875m, rainforest, 19 October 1994, B. L. Fisher [BLF1076] (CASENT9006020, 1♂, CAS). *Fianarantsoa Province*: Réserve Nationale Intégrale Andringitra, Anjavidilay, 8.5 km SE Atanifotsy, 22°09.5'S, 46°57.6'E, elev. 1990m, pitfall trap in *Philippia*-dominated sclerophyllus forest, 5–11 March 1997, S. E. Goodman (CASENT9064649, 2♂, FMNH). *Toamasina Province*: Réserve Nationale Intégrale Betampona, 35.1 km NW Toamasina, 17°55'11"S, 049°12'01"E, elev. 525m, rainforest, malaise trap, 25 May–1 June 2008, coll. B. L. Fisher [BLF19594\_23] (Holotype, CASENT9052542, 1♂, CAS), (paratype, CASENT9042359, 1♂, CAS).

**Natural history.** Collection records document the occurrence of *Uduba lamba* in *Philippia* dominated sclerophyllus forest in far southern Madagascar and in rainforest at scattered localities in eastern Madagascar. They make no use of cribellate silk.

**Distribution.** The few records suggest that the species *Uduba lamba* may be widespread in eastern Madagascar (Maps 12, 13).

### *Uduba lavitra*, new species

Figures 75 A–C, F, Maps 8, 15.

**Type material.** Holotype female (CASENT9030898) and paratype female (CASENT9064776) collected 29 March 2004 by the Malagasy ant team from a rotten log at marsh edge in montane rainforest at 1070m elevation at Torotorofotsy (18°52'15"S, 048°20'51"E), Toamasina Province, Madagascar, deposited in the CAS. Paratype female (CASENT9030895), collected 23 March 2004 by the Malagasy ant team at 1075m elevation from montane rainforest at Ambatovy, 18°51'03"S, 048°19'17"E, Toamasina Province, Madagascar, also deposited in CAS.

**Etymology.** The species epithet is from a Malagasy word *lavitra*, meaning far, referring to the great distance from the end of the epigynal medial lobe (ML) to the epigynal groove; an adjective in apposition.

**Diagnosis.** *Uduba lavitra* belong to Group I.c, the *Uduba funerea* group (Map 15) of Group I, the Epigynal atrium group. They are ecribellate, with a colulus; female with epigynal plate with median lobe surrounded by depressed atrium, epigynal plate extensive posteriad of atrium, height greater than 0.15 times epigynal length, median lobe narrow, especially anteriorly, atrium width greater than three times ML width (Figs. 75 A, C). Male unknown.

**Description.** Male unknown. **Female** (Holotype): Total length 17.50. Markings typical of *Uduba*. Carapace 7.70 long, 5.50 wide, 3.20 high; clypeus 0.55 high. Eye diameters: AME 0.24, ALE 0.26, PME 0.28, PLE 0.34. Chelicerae 2.00 long; sternum 3.40 long, 2.70 wide; labium 1.90 long; palpal coxae 2.70 long. With a colulus. Spination: palpus–femur d0-1-2, patella p1-0, tibia d1-0, p2-0, tarsus p2-1, r0-1-0; leg I–femur d1-0-0, p0-0-2, tibia v2-2-2-2, metatarsus v2-2-3; leg II–femur d1-0-0, p0-0-1, tibia p0-1-0, v2-1-1-2, metatarsus v2-2-3; leg III–femur d1-0-0-1, p0-1-1-0, r0-1-1-0, tibia p0-1-1-0, v1-2-2, r0-1-1-0, metatarsus p1-2-2, v2-2-2, r1-1-2; leg IV–femur d1-0-0, r0-0-1, tibia v1-2-2, r0-1-1-0, metatarsus d0-1-0, p1-1-2, v2-2-2, r1-2-2. Scopulae: strong ventral beneath tarsi I–IV and metatarsus I, apical half of metatarsi I and II and apices of metatarsi III and IV. Leg measurements: I: 6.40 + 2.80 + 5.50 + 4.80 + 3.00 = 22.50; II: 5.50 + 2.60 + 5.50 + 4.30 + 2.60 = 20.50; III: 4.40 + 2.20 + 2.70 + 3.70 + 2.10 = 15.10; IV: 6.00 + 2.40 + 5.10 + 6.00 + 2.40 = 21.90; palpus: 2.60 + 1.35 + 1.70 + NA + 2.70 = 8.35. Leg formula 1423. **Female genitalia:** epigynal plate with median lobe surrounded by depressed atrium (Fig. 75 A), epigynal plate width 1.25 times length; atrium sides convex, atrium width 1.82 times atrium length; epigynum

length 2.36 times atrium length, atrium width 0.62 epigynum width; atrium width at side of ML 1.22 times ML width; epigynal plate extending far posteriad of atrium, atrium origin at 0.28 times epigynum length from epigastric groove; median lobe (Fig. 75 A) very narrow, nearly straight sided and slightly wider at base, median lobe length 2.67 times width, length 1.47 times atrium length, 0.60 times epigynal length, extending far anteriad of atrium, ML extent anteriad of atrium 0.59 times epigynal length; lateral lobes narrow, atrium width 5.17 times LL width; copulatory openings beneath midpoint of lateral margin of atrium. Vulva (Fig. 75 B) with spermathecal ducts making 2–3 broad curves, vulva length 0.68 times width, vulva width 3.88 times distance between fertilization ducts.

**Variation.** (N=3). Total length 17.00–17.50; carapace length / width 1.40–1.54, carapace height / width 0.56–0.61, PER / carapace width 0.45–0.47, PER/OAL 3.24–3.34, PER/AER 1.29–1.43, OAL/OQL 1.12–1.19, OQP / OQA 1.09–1.18, clypeus height / AME diameter width 1.54–2.29, cheliceral length / clypeus height 7.65–9.25, sternum length / width 1.26–1.29, palpal coxa length / width 2.00–2.45, femur I length / carapace width = 1.08–1.16, metatarsus I length / carapace width 0.87–0.90, femur IV length / carapace width 1.09–1.17, palpal tarsus length / carapace width 0.49–0.52, palpal tibia length / palpal patella length 1.86–2.00, palpal tarsus length / palpal tibia length 1.59–1.73, palpal tarsus length / palpal femur length 0.96–1.04, palpal tibia length / palpal patella length 1.07–1.26. Epigynal plate (Figs. 75 A, C) width 1.25–1.36 times length; atrium width 0.56–0.62 epigynum width; atrium origin at 0.18–0.275 times epigynum length from epigastric groove; median lobe length 2.67–2.83 times width, length 1.24–1.47 times atrium length, 0.52–0.60 times epigynal length, ML spreads narrowly (Fig. 75 C) or broadly (Fig. 75 A) at base; atrium width 4.17–5.17 times LL width. Vulva with spermathecal ducts making two (Fig. 75 B) or three (Fig. 75 F) broad curves, vulva length 0.68–0.83 times width, vulva width 3.88–7.25 times distance between fertilization ducts (Figs. 75 B, F). Male variation unknown, only females have been collected.

**Material examined.** MADAGASCAR: *Toamasina Province*: Torotorofotsy, 18°52'15"S, 048°20'51"E, elev. 1070m, ex-rotten log, marsh edge, montane rainforest, 29 March 2004, collectors Malagasy ant team (holotype, CASENT9030898, 1♀, CAS, paratype, CASENT9064776, 1♀, CAS.); Ambatovy, 18°51'03"S, 048°19'17"E, elev. 1075m, general collecting spiders, montane rainforest, 23 March 2004, (paratype, CASENT9030895, 1♀, CAS).

**Natural history.** These ecribellate spiders have been collected in montane rainforest. The holotype of *Uduba lavitra* was found hiding within a rotten log, but we know nothing of any use of silk.

**Distribution.** *Uduba lavitra* are known only from two nearby localities in montane rainforest in Toamasina Province in central Madagascar (Maps 8, 15). Their forest habitat is threatened by a huge chrome-ore strip mine, which currently extends to less than a kilometer from the collection site of the paratype (GoogleEarth, 26 October 2021).

### *Uduba lehibekokoa*, new species

Figures 9 C, 50 A–C, Maps 7, 14.

**Type material.** Holotype (CASENT9017929) and paratype (CASENT9017361) males from tropical dry forest at 140m elevation (16°28'S, 45°21'E) in Parc National de Namoroka, Mahajanga Province, Madagascar, collected 4–8 November 2002 by the Fisher-Griswold Arthropod Team, deposited in the California Academy of Sciences.

**Etymology.** The species name is from the Malagasy words *lehibe*, meaning big or large, and *kokoa*, signifying bigger or larger. This refers to the large size of spiders of this species: *Uduba lehibekokoa* are much larger than the similar *Uduba woodae*. A compound adjective in apposition.

**Diagnosis.** *Uduba lehibekokoa* are members of Group I.b, the *Uduba woodae* group (Map 14) of Group I, the Epigynal atrium group. They are cribellate, with divided cribellum or vestige. Males can be distinguished from those of other *Uduba* by having the palp with TA2 highly sclerotized, black, concave medially against TA3 (Fig. 50 A), distinguished from *U. schlingeri* by having the TA2 concave but not chelate (TA2 chelate in *U. schlingeri*, Figs. 61 B, 62 C, E), and from *U. taralily* by having a simple MA (Fig. 50 B) (*U. taralily* with MA concave with lateral projections, Fig. 63 B). *Uduba lehibekokoa* specimens are distinguished from *U. woodae* by having the MA A–C, and specimens are larger size, total length 14.00–15.50 (*U. woodae* males have a sharp point on the MA, the TA3 apex is blunt, the VTA is short and straight, length less than twice width, Figs. 66 A–C, and specimens are less than 12.50 total length). Female unknown.

**Description. Male** (Holotype): Total length 15.50. Markings as in Fig. 9 C. Carapace 8.80 long, 6.70 wide, 3.80 high; clypeus 0.40 high. Eye diameters: AME 0.26, ALE 0.28, PME and PLE 0.34. Chelicerae 3.80 long; sternum 4.10 long, 3.00 wide; labium 2.10 long; palpal coxae 2.80 long. Cribellum divided. Spination: palpus–femur d1-1-3; leg I–femur d1-1-1, p0-1-1-1, r1-1-1-1, patella p1, r1, tibia d0-0-1-1, p0-1-1-0, v2-2-2-2, r0-1-1-0, metatarsus p1-0-1-1, v2-2-1-2, r1-1-1-1; leg II–femur d1-1-1, p1-1-1-1, r0-1-1-1, patella p1, r1, tibia d0-0-1-0, p0-1-2-0, v2-2-2-2, r0-1-0-0, metatarsus p1-1-1, v2-2-1-2, r1-1-1; leg III–femur d1-1-1, p1-1-1-1, r1-0-1-1, patella r1, tibia d0-1-0, p0-1-1-0, v2-2-2, r0-1-1-0, metatarsus p1-2-2, v2-2-1-2, r1-1-2; leg IV–femur d1-1-0, p1-1-1-1, patella r1, tibia d0-0-1-0, p0-1-1-0, v2-2-2, r0-1-1-0, metatarsus p0-1-1-2, v2-2-2-1-2, r0-1-1-2. Scopulae: cymbium, apicodorsal; tarsi and apices of metatarsi I–IV, ventral. Leg measurements: I:  $9.00 + 3.90 + 9.30 + 9.60 + 4.70 = 36.50$ ; II:  $8.10 + 3.50 + 7.70 + 8.80 + 5.00 = 33.10$ ; III:  $7.10 + 3.10 + 5.00 + 7.30 + 3.80 = 26.30$ ; IV:  $9.20 + 3.20 + 7.60 + 11.50 + 5.00 = 36.50$ ; palpus:  $3.30 + 1.60 + 1.50 + \text{NA} + 4.30 = 10.70$ . Leg formula [1=4]23. **Male palp:** palpal tibia 0.36 times cymbial length, RTA broadly triangular, RTA length 0.29 tibia length, length 1.11 times width, with pointed apex (Fig. 50 C), VTA tapering to a slender, hooked apex (Figs. 50 A, C), length 3.67 times width, VTA length 0.305 times tibia width; tibia lacking stout spines; tegulum convex, without ridge (Figs. 50 B, C), tegulum length 0.98 times width; TA1 extends distad of tegulum apex, TA1 extends past TA3 apex by 1.32 times tegulum length; TA3 transverse, concave dorsally, tapering to a point that is recurved apically (Fig. 50 B), TA3 apex visible in front of TA2; TA2 highly sclerotized, black (Figs. 50 B, C), concave medially against TA3, TA2 and TA3 apices at same level; MA transverse, simple, origin at 0.53 times tegulum length, tegulum apex at 0.22 tegulum length from MA apex, length (including apical processes) 0.44 times width, MA small, length 0.18 tegulum length, width 0.39 times tegulum width (Figs. 50 A–C); conductor fan entire. **Female:** Unknown.

**Variation** (Males, N = 2). Total length 14.00–15.50, carapace length / width = 1.29–1.31, carapace height / width = 0.38–0.57, PER / carapace width = 0.31–0.34, PER / OAL = 2.64–2.82, PER / AER = 1.36–1.47, OAL / OQL = 1.00–1.05, OQP / OQA = 1.21–1.31, clypeus height / AME diameter width = 1.54–1.73, cheliceral length / clypeus height = 8.00–9.50, sternum length / width = 1.37–1.41, femur I length / carapace width = 1.31–1.34, metatarsus I length / carapace width = 1.43–1.46, femur IV length / carapace width = 1.35–1.37, cymbium length / carapace width = 0.64–0.65, cymbium length / palpal patella length = 2.69–4.20, cymbium length / palpal tibia length = 2.87–3.00, cymbium length / palpal femur length 1.24–1.30, palpal tibia length / palpal patella length = 0.94–1.40. Female variation unknown.

**Material examined.** MADAGASCAR: *Mahajanga Province*: Parc National de Namoroka, 9.8 km 300°WNW Vilandro, 16°28'S, 45°21'E, elev. 140m, tropical dry forest, general collecting day spiders, 4–8 November 2002, Fisher-Griswold Arthropod Team [BLF6451] (holotype, CASENT9017929, 1♂, CAS), general collecting night spiders, 4–8 November 2002, Fisher-Griswold Arthropod Team [BLF6449] (paratype, CASENT9017361, 1♂, CAS).

**Natural history.** Members of the cribellate species *Uduba lehibekokoa* occur at low elevation (140m) in tropical dry forest. We know nothing of their use of silk.

**Distribution.** The species *Uduba lehibekokoa* is known only from the type locality in far western Madagascar (Maps 7, 14).

***Uduba madagascariensis* (Vinson, 1863)**

Figures 1 F, 2 E, 6 C, 7 L, 20 E, 29 C, 51 A–C, 52 A–F, 68 A–D, 69 A–G, 80 C, Maps 4, 21.

*Olios madagascariensis* Vinson, 1863: 100, 305.

*Uduba madagascariensis* Simon, 1880: 343; Simon, 1906: 293, Lehtinen, 1967: 272, fig. 81, male palp. Griswold et al., 2005: 44, figure 185 B, C.

*Uliodon madagascariensis* Simon, 1887: 158.

**Etymology.** Vinson (1863) named this species for its occurrence in Madagascar.

**Identification.** Vinson's 1863 description (Vinson, 1863: 100–102) reports mostly the markings of this large (18mm total length) male spider. The description, which states “Aspect général. Allonge, fauve dore avec deux bandes allongées, brun fauve, sur les côtés, de corselet; une bande médiane moins prononcée sur l'abdomen” (Vinson, 1863: 100), is consistent with the markings of other individuals of this species. Especially telling is “J'ai trouvé ce grand *Olios* le soir dans ma chambre à Tananarive” (Vinson, 1863: 103); this species occurs in and around the city of Antananarivo and is likely to be found in buildings, as was Vinson's specimen. The description and Vinson's collection record leave no doubt of the identification of *Olios madagascariensis* Vinson with *U. madagascariensis* (Vinson, 1863). Lehtinen (1967: 272) examined males and females of this species. He quotes the following data: “*Uduba* Simon 1880, Acta Soc. Linn. Bordeaux 34, 343: *Olios madagascariensis* Vinson 1863, Aran. Reun. Mauric. Madag., 100 from Madagascar (male ? type Paris; female described by Simon 1906: Paris).” He also contributed figures, including an unmistakable female epigynum, as his figures 81 and 84.

**Remarks.** This large, ecribellate species comprises populations in the central highlands with several records near Antananarivo as well as populations in the west and southwest of the island. Males are alike in the form of the TA3, TA2 and MA though there is variation in the outline of the tegulum. All females have the epigynal median lobe placed anteriorly and the lateral lobes fused posteriorly but the posterior shape of the ML varies even within populations (Figs. 69 A–G). All except the remarkable female from the Réserve Forestière Beanka in Mahajanga Province (Fig. 69 G) have the anterior margin of the ML truncate. Geography and variation are further discussed at the end of the description. Because of this degree of variation, we have lumped individuals with a variety of epigynal forms into the single species *U. madagascariensis* (Vinson, 1863).

**Diagnosis.** *Uduba madagascariensis* are an Unclassified species (Map 21), which is ecribellate (Fig. 20 E). Males of *U. madagascariensis* (Vinson, 1863) can be distinguished from those of other ecribellate *Uduba* by the form of the palp (Figs. 29 C, 51 A–C): the MA is small, transverse and with a small, prolateral point (Fig. 52 D), the TA3 forms a short hook (Fig. 51 B), the TA2 is sclerotized and partially occludes the TA3 (Figs. 29 C, 51 A): it is erect and bifid apically with the proapical element longer (Figs. 52 A–F). The females can be distinguished from those of other ecribellate *Uduba* by having an epigynum with an anterior median lobe and the lateral lobes fused posteriorly (Figs. 68 A, 69 A–G); in most specimens no atrium is visible (or rarely visible) and the copulatory openings are hidden or nearly hidden at the sides of the ML (Figs. 68 A–D).

**Description. Male** (CASENT9006030, Antananarivo): Total length 18.57. Markings as in Figs. 1 F, 2 E, 6 C, carapace light with dark longitudinal bands. Carapace 10.00 long, 7.07 wide, 3.14 high; clypeus 0.43 high. Eye diameters: AME, ALE and PME 0.36, PLE 0.43. Chelicerae 4.29 long; sternum 5.00 long, 1.64 wide; labium 2.18 long; palpal coxae 3.29 long. With a colulus.



Spination (CASENT9006029, Antananarivo): palpus–femur d1-1-1, p0-0-1, r0-0-1, patella p1-0, tibia p1-0, r0-1-0; leg I–femur d1-1-1, p0-1-2, r1-1-1-1, patella p1, r1, tibia d1-0-1-1, p0-1-1-0, v2-2-2-2, r0-1-1-0, metatarsus p1-1-2, v2-2-2, r1-1-1; leg II–femur d1-1-1, p0-1-2, r1-1-1-1, patella p1, r1, tibia d1-0-1-1, p0-1-1-0, v2-2-2-2, r0-1-1-0, metatarsus p1-1-2, v2-2-2, r1-1-1; leg III–femur d1-1-1, p1-1-1-1, r1-1-1-1, patella p1, r1, tibia d1-0-1-0, p0-1-1-0, v2-1-2, r0-1-1-0, metatarsus d0-1-0, p1-1-2, v2-2-2, r1-1-2, tarsus v0-1-0; leg IV–femur d1-1-1, p1-1-1-1, r0-1-1-1, patella r1, tibia d1-0-1-0, p0-1-1-0, v2-2-2, r0-1-1-0, metatarsus d0-1-0, p1-1-2, v2-2-1, r1-1-2. Scopulae: cymbium, apicodorsal; tarsi and apical metatarsi I–IV, ventral. Leg measurements (CASENT9006030, Antananarivo): I:  $9.43 + 3.57 + 10.00 + 10.14 + 6.14 = 39.29$ ; II:  $9.00 + 4.14 + 8.83 + 9.29 + 5.14 = 36.00$ ; III:  $7.57 + 3.29 + 5.86 + 7.57 + 4.29 = 28.57$ ; IV:  $10.14 + 3.43 + 9.29 + 11.86 + 5.71 = 40.43$ ; palpus:  $4.29 + 1.64 + 1.93 + \text{NA} + 4.29 = 12.14$ . Leg formula 4123. **Male palp** (CASENT9006026, Ambohimanga) (Figs. 29 C, 51 A–C, 52 A–F): palpal tibia 0.44 times cymbial length, RTA a broad triangle (Fig. 51 C), RTA length 0.20 tibia length, length 0.89 times width, with bluntly-pointed apex (Fig. 52 C), VTA short, stout (Figs. 51 B, 52 C), VTA length 2.25 times width, length 0.36 tibia width, tibia with slender proand retrolateral spines but lacking stout spines (Fig. 51 B); tegulum convex, without ridge, tegulum length 1.02 times width; TA1 extends distad of tegulum apex (Fig. 29 C), TA1 extends past TA3 apex by 1.16 times tegulum length; TA3 with slender, upturned curve at apex (Figs. 52 B, D), TA3 extends apicad of TA2 by 1.12 times tegulum length, TA2 large, erect, with forked apex, extends in front of TA3 (Figs. 52 A–E); MA simple, with small prolateral hook (Fig. 29 C), origin at 0.55 times tegulum length, tegulum apex at 0.20 tegulum length from MA apex, MA length (including apical processes) 0.82 times width, MA very small (Figs. 51 A, 52 B, D), length 0.20 tegulum length, width 0.26 tegulum width; conductor fan entire (Fig. 52 B). **Female** (CASENT9006029, Ambohimanga): Total length 16.71. Markings as in Fig. 7 L, with strong longitudinal dark bands on carapace. Carapace 8.86 long, 6.93 wide, 3.93 high; clypeus 0.71 high. Eye diameters: AME 0.27, ALE 0.29, PME 0.30, PLE 0.32. Chelicerae 4.86 long; sternum 4.29 long, 3.21 wide; labium 2.32 long; palpal coxae 3.29 long. With a colulus (Fig. 20 E). Spination: (CASENT9006031): palpus–femur d0-1-1, p0-0-1, patella p1-0, tibia p2-1, r1-0, tarsus p2-1, v0-0-1, r1-0; leg I–femur d1-0-1, p0-0-1, tibia v2-2-2-2, metatarsus p0-0-1, v2-2-2; leg II–femur d1-0-0, p0-1-0-1, r1-1-0-0, tibia p0-1-1-0, v1-1-2, metatarsus p0-0-1, v2-2-2; leg III–femur d1-0-0-1, p1-1-0-0-1-1, r1-1-1-1, tibia d1-0-1, p1-0-1, v2-1-2, r1-0-1, metatarsus d1-1-0-0, p1-1-2, v2-2-2, r1-1-2; leg IV–femur d1-1-1, p1-0-1, tibia p1-0-0, v2-1-3, r1-0-1, metatarsus p1-1-1-2, v2-1-2-2, r1-1-2. Scopulae: ventral on tibia–tarsus I, metatarsus–tarsus II and III, apical metatarsus–tarsus IV. Leg measurements (CASENT9006029, Ambohimanga): I:  $7.14 + 3.21 + 5.93 + 5.21 + 3.43 = 24.93$ ; II:  $6.29 + 3.00 + 5.00 + 4.64 + 3.07 = 22.00$ ; III:  $5.29 + 2.64 + 3.00 + 4.00 + 2.64 = 17.57$ ; IV:  $6.57 + 3.00 + 5.79 + 6.57 + 3.57 = 25.50$ ; palpus:  $3.21 + 1.71 + 2.00 + \text{NA} + 2.93 = 9.86$ . Leg formula 4123. **Female genitalia** (Ambohimanga, CASENT9006029): epigynal plate (Fig. 69 A) with large, anteromedian lobe, atrium only visible at posterolateral corners; epigynal plate width 1.21 times length; median lobe located in anterior half of epigynal plate, origin at 0.48 times epigynum length, free anteriorly but undefined posteriorly, convex, bulging, width 0.50 times epigynum width, with copulatory openings beneath anterolateral margin, distance between copulatory openings 0.43 times epigynum width, CO origin at 0.79 of epigynum length; posterior margin of epigynal plate strongly marked, indented on each side of median projection. Vulva (Fig. 69 B) with spermathecal ducts forming three loops (Fig. 80 C), vulva length 0.78 times width, fertilization ducts close together, vulva width 10.80 times distance between fertilization ducts; copulatory opening (CO) leads into short copulatory duct (CD), spermathecal head (HS) near CO (Figs. 68 B–D).

**Variation.** **Male** (N = 6): Total length 11.90–18.57; ratios of carapace length /width = 1.38–

1.45, carapace height / width = 0.44–0.65, PER / carapace width = 0.36–0.79, PER / OAL = 2.54–3.38, PER / AER = 1.33–1.49, OAL / OQL = 1.00–1.22, OQP / OQA = 1.08–1.14, clypeal height / diameter AME = 0.80–1.82, cheliceral length / clypeal height = 7.57–18.00, sternum length / width = 1.43–1.52, palpal coxa length / width = 2.20–2.68, ratio of length femur I / carapace width = 1.31–1.46, metatarsus I length / carapace width = 1.42–1.65, femur IV length / carapace width = 1.37–1.46, palpal cymbium length / carapace width = 0.59–0.69, cymbium length / palpal patella length = 2.42–2.77, cymbium length / palpal tibia length = 2.22–2.57, cymbium length / palpal femur length = 1.00–1.24, palpal tibia length / palpal patella length = 1.00–1.17. A male from Toliara Province has the retroapical corner of the tegulum that makes a right angle, whereas in males from Antananarivo and Fianarantsoa Provinces the retroapical corner of the tegulum is smoothly convex (Figs. 51 B, 52 A–F). **Female** (N = 5): Total length 15.60–20.86; ratios of carapace length / width = 1.28–1.58, carapace height / width = 0.56–0.65, PER / carapace width = 0.39–0.67, PER / OAL = 2.81–3.84, PER / AER = 1.27–1.54, OAL / OQL = 1.00–1.05, OQP / OQA = 0.91–1.16, clypeal height / diameter AME = 1.25–2.67, cheliceral length / clypeal height = 6.67–10.00, sternum length / width = 1.31–1.48, palpal coxa length / width = 1.85–2.54; ratio of femur I length / carapace width = 1.03–1.25, metatarsus I length / carapace width = 0.75–0.89, femur IV length / carapace width = 0.95–1.19, palpal tarsus length / carapace width = 0.42–0.54, palpal tarsus length / palpal patella length = 1.67–2.00, palpal tarsus length / palpal tibia length = 1.46–1.65, palpal tarsus length / palpal femur length = 0.70–0.97, palpal tibia length / palpal patella length = 1.05–1.21. Specimens from Antananarivo and Fianarantsoa Provinces have the epigynal atrium completely hidden beneath ML, ML anteriorly straight to convex, with the posterior margin of the ML visible as a line on the epigynal plate, convex or sharply pointed (Figs. 68 A, 69 A). In these specimens the posterior margin of the ML extends 0.20 to 0.40 of the distance to posterior margin of plate, the ratio of ML length / ML width is 1.38–1.61 and the ratio of ML length / epigynum length is 0.29–0.38. Individuals from Toliara Province also have the atrium completely hidden beneath the ML (Analavelona) and the ML oval to wider anteriorly (Figs. 69 C–F). A female from Réserve Forestière Beanka in Mahajanga Province (CASENT9042529) has the most distinct epigynum (Fig. 69 G): the atrium is visible at the sides of and also posteriad of the ML and both the anterior and posterior ends of the ML taper and become narrow, with no clear margins. In this individual the ML length is 1.17 times the ML width. The vulva length / width varies slightly (Figs. 68 B–D, 69 B, 80 C).

**Material examined.** MADAGASCAR: *Antananarivo Province*: Ambohimanga, forest near village, 18°44'S, 47°, 34'E, elev. 1400m, night collecting, "specimens from short burrows surmounted by short turrets of woven grass, mostly on steep banks", 2 November 1993, C. Griswold, S. Larcher, N. Scharff, [CEG009] (CASENT9006029, 1♂, 1♀, CAS), (CASENT9006025, 1♂, CAS), (CASENT9006026, 1♂, 3jj, CAS), (CASENT9010645, 1♂, 1♀, CAS); Ambohimanga, Antsahafoy, 1967 (CASENT9064666, 1♀, 16jj, MNHN); Antananarivo, in suburbs of city, living habitus photos by N. Scharff, Figures 1A, 2E [this publication], 8 December 1993, Rija Andriamasimanana (CASENT9006030, 1♂, CAS); "Madagascar C., Ambohimanga-Tananrive", December 1946, J. Millot (1♀, MNHN). *Fianarantsoa Province*: Centre route d'Ambositra à Ambohimanga du Sud, km 39 (coordinates approximate): S20.867°, E47.155°, elev. 1350m, 6–11 November 1963, P. Viette (CASENT9006032, 1♂, MNHN); Italaviana, 35 km SSE of Antsirabe, 20°10.40'S, 47°05.16'E, elev. 1360m, malaise trap in *Uapaca* forest, 13 March–24 April 2005, M. Irwin, R. Harin'Hala [MA-24-70] (CASENT9044392, 1♂, CAS). *Mahajanga Province*: Réserve Forestière Beanka, 50.7 km E Maintirano, 17°52'49"S, 044°28'08"E, yellow pan trap at 140m elevation in tropical dry forest on tsingy, 28–31 October 2009, B. L. Fisher [BLF23000] (CASENT9042529, 1♀, CAS). *Toliara Province*: Forêt Classée d'Analavelona, 29.2 km

343°NNW Mahaboboka, 22°40'30"S, 044°11'24"E, elev. 1100m, pitfall trap in montane rainforest, 18–22 February 2003, coll. Fisher, Griswold *et al.*, [BLF7817] (CASENT9018653, 1♀, CAS); Forêt Analavelona, near source of Manasy River, 16.5 km NW Andranoheza, 22°38.6'S, 44°10.3'E, elev. 1250m, undisturbed mid-altitude forest with dry and humid elements, pitfall traps, 2–8 November 2000, S. Goodman (FMDH-00-224, 1♂, FMNH); Forêt Analavelona, Antanimena, 12.5 km NW Andranoheza, 22°40.7'S, 44°11.5'E, elev. 1050m, transitional mid-altitude forest with elements of eastern and western forests, pitfall trap, 9–15 March 1998, S. Goodman (CASENT9065670, 1♀, FMNH), (CASENT9006028, 1♀, 2jj, FMNH).

**Natural history.** This remarkable, ecibellate species occurs in native forest on the plateau, dry forests in the west and southwest, in *Uapaca* forest and even in disturbed areas near the large city of Antananarivo. *Uduba madagascariensis* (Vinson, 1863) make no use of cribellate silk but create silk-lined burrows: at Ambohimanga specimens were collected “from short burrows surmounted by short turrets of woven grass, mostly on steep banks.” Males wander (Figs. 1 F, 2 E). Adult female individuals of the western populations from Réserve Forestière Beanka and Forêt Classée d'Analavelona were collected in pitfall traps, suggesting that these ecibellate spiders may occasionally wander even as adult females.

**Distribution.** Typical individuals of *Uduba madagascariensis* are known from Madagascar in Antananarivo and Fianarantsoa Provinces, on the east central part of the central plateau. Populations of *U. madagascariensis* that may have distinct genitalia occur on the western side of the escarpment in southwestern Madagascar, from Mahajanga and Toliara Provinces (Maps 4, 21).

### *Uduba milamina*, new species

Figures 76 C, F, I, Maps 8, 15.

**Type material.** Holotype female (CASENT9010797) collected at the Ranomafana-Radio Tower in Fianarantsoa Province, Madagascar, by R. Harin'Hala from 21–24 December 2001, deposited in CAS. Paratype female (CASENT9006100) collected from soil at 720m elevation in the Andringitra Reserve, Fianarantsoa Province, Madagascar, by Steve Goodman on 19–20 November 1993, deposited in FMNH.

**Etymology.** The species epithet is from a Malagasy word *milamina* meaning neat; an adjective in apposition.

**Diagnosis.** *Uduba milamina* belong to Group I.c, the *Uduba funerea* group (Map 15) of Group I, the Epigynal atrium group. They are ecibellate, with a colulus; female with epigynal plate with median lobe surrounded by depressed atrium; epigynal plate short or nearly absent posteriad of atrium, height less than 0.12 times epigynal length, median lobe narrow, atrium width greater than three times ML width (Figs. 76 C, I). Male unknown.

**Description.** Male unknown. **Female** (Holotype): Total length 15.00. Markings typical of *Uduba*. Carapace 7.70 long, 4.65 wide, 3.20 high; clypeus 1.10 high. Eye diameters: AME 0.22, ALE and PME 0.26, PLE 0.34. Chelicerae 3.40 long; sternum 3.20 long, 2.30 wide; labium 1.60 long; palpal coxae 2.40 long. With a colulus. Spination: palpus–femur d0-0-1, patella p1-0, tibia p2-0, tarsus p2-1; leg I–femur d1-0-0, p0-0-1, tibia v2-2-2-1, metatarsus v2-2-3; leg II–femur d1-0-0, p0-0-1, tibia v1-1-1-0, metatarsus v2-2-3; leg III–femur d0-1-0-0, p0-0-1, tibia p0-1-1-0, v1-1-2, r0-1-1-0, metatarsus p1-2-2, v2-2-2, r1-1-2; leg IV–femur d1-0-0, tibia v1-1-2, r0-1-1-0, metatarsus p0-1-2, v2-1-2-2, r0-2-2. Scopulae: strong ventral beneath tarsi I–IV and metatarsus I and II, on apices of metatarsi III and IV and on apices of tibiae I and II. Leg measurements: I: 5.60 + 2.50 + 4.80 + 4.00 + 2.30 = 19.20; II: 4.60 + 2.30 + 3.90 + 3.70 + 2.10 = 16.60; III: 3.80 + 1.80 + 2.10 + 3.00 + 1.80 = 12.50; IV: 5.10 + 2.10 + 4.30 + 5.00 + 2.30 = 18.80; palpus: 2.70 + 1.30 + 1.40 + NA + 2.50 = 7.90. Leg formula 1423. **Female genitalia:** epigynal plate with median lobe

surrounded by depressed atrium (Fig. 76 C), plate width 1.21 times length; atrium sides weakly concave, atrium width 1.48 times atrium length; epigynum length 1.68 times atrium length, atrium width 0.73 times epigynum width, atrium origin at 0.12 times epigynum length from epigastric groove; median lobe narrow (Fig. 76 C), wider towards base, atrium width at side of ML 1.27 times ML width; epigynal ML length 2.36 times width, length equal to atrium length, ML extending to apex of atrium, ML 0.62 times epigynal length; lateral lobes narrow, atrium width 9.25 times LL width; copulatory openings beneath median lateral margins of atrium. Vulva (Fig. 76 F) with spermathecal ducts making broad, curved copulatory duct and single anterior spiral, vulva length 0.61 times width, fertilization ducts close together, vulva width 4.67 times distance between fertilization ducts.

**Variation.** (N=2) Total length 15.00–16.00. **Ratios**—carapace length / width = 1.54–1.66, carapace height / width = 0.57–0.69, PER / carapace width = 0.42–0.46, PER/OAL = 3.23–3.53, PER/AER = 1.39–1.41, OAL/OQL = 1.07–1.20, OQP/ OQA = 1.19–1.26, clypeus height / AME = 2.25–5.00, cheliceral length / clypeus height = 3.09–7.33, sternum length / width = 1.35–1.39, palpal coxa length / width = 2.09–2.18, metatarsus I length / carapace width = 0.83–0.86, femur IV length / carapace width = 1.10–1.11, palpal tarsus length / carapace width = 0.48–0.54, palpal tibia length / palpal patella length = 1.69–1.92, palpal tarsus length / palpal tibia length = 1.57–1.79, palpal tarsus length / palpal femur length = 0.85–0.93, palpal tibia length / palpal patella length = 1.08. Spines beneath the leg tarsi may be absent (holotype, Ranomafana) or present (paratype, Andringitra). Epigynal plate width 1.16–1.21 times length (Figs. 76 C, I) epigynum length 1.68–1.94 times atrium length, atrium origin at 0.10–0.12 times epigynum length from epigastric groove; epigynal median lobe length 2.36–4.75 times width, ML length 1.00–1.19 times atrium length; broad, curved copulatory duct making one or one and a half anterior spirals, vulva length 0.61–1.20 times width, fertilization ducts close together, vulva width 4.67–5.00 times distance between fertilization ducts (Figs. 76 C, F, I).

**Material examined.** MADAGASCAR: *Fianarantsoa Province*: Ranomafana Radio Tower, 21°15.05'S, 47°24.43'E, malaise canopy trap at an open area at the forest edge, 21–24 December 2001, R. Harin'Hala (holotype, CASENT9010797, 1♀, CAS); edge of Andringitra Reserve, ca. 45 km S Ambalavao, on east bank of Iantara River, along Ambalamanenjana-Ambatomboay trail, camp #1, 22°13'20"S, 47°01'20"E, elev. 720m, from soil, 19–20 November 1993, S. Goodman (paratype, CASENT9006100, 1♀, FMNH).

**Natural history.** The paratype female of *Uduba milamina* was collected in soil and the female holotype of this ecribellate spider was collected in a malaise canopy trap at an open area at the forest edge, suggesting that this species is terrestrial but may wander in vegetation.

**Distribution.** *Uduba milamina* are known from upland eastern forest from central and southern Madagascar (Maps 8, 15).

### *Uduba orona*, new species

Figures 75 D, E, Maps 4, 15.

**Type material.** Holotype female (CASENT9006101) from soil at 1625m elevation on ridge E of Volotsangana River, 22°11'39"S, 46°58'16"E, Andringitra Reserve, Fianarantsoa Province, Madagascar, collected by Steve Goodman on 12–13 December 1993, deposited in FMNH.

**Etymology.** The species epithet is from a Malagasy word for nose, *orona*, referring to the shape of the median lobe (ML); a noun in apposition.

**Diagnosis.** *Uduba orona* belong to Group I.c, the *Uduba funerea* group (Map 15) of Group I, the Epigynal atrium group. They are ecribellate with a colulus. The female has the epigynal plate with median lobe surrounded by depressed atrium; the median lobe is broad and extends to or

bulges across epigastric furrow, ML length greater than 1.75 times width (Fig. 75 D). The male of *Uduba orona* is unknown.

**Description.** Male unknown. Female (holotype): Total length 14.50. Markings typical of *Uduba*. Carapace 7.60 long, 5.20 wide, 3.00 high; clypeus 0.55 high. Eye diameters: AME, ALE and PLE 0.26, PME 0.22. Chelicerae 3.50 long; sternum 3.40 long, 2.60 wide; labium 1.70 long; palpal coxae 2.55 long. **Ratios**—carapace length / width = 1.46, carapace height / width = 0.58, PER / carapace width = 0.41, PER/OAL = 3.24, PER/AER = 1.35, OAL/OQL = 1.22, OQP/ OQA = 1.09, clypeus height / AME = 2.12, cheliceral length / clypeus height = 6.36, sternum length / width = 1.31, palpal coxa length / width = 2.32, femur I length / carapace width = 1.13, metatarsus I length / carapace width = 0.79, femur IV length / carapace width = 1.10, palpal tarsus length / carapace width = 0.48, palpal tibia length / palpal patella length = 1.92, palpal tarsus length / palpal tibia length = 1.67, palpal tarsus length / palpal femur length = 0.86, palpal tibia length / palpal patella length = 1.15. With a colulus. Spination: palpus—femur d0-0-1, patella p1-0, tibia d0-1-0, p2-0, tarsus p2-1; leg I—femur d1-0-0, p0-0-1, tibia v2-2-2-0, metatarsus v2-2-3; leg II—femur d1-0-0-1, p0-1-1-0, tibia p0-0-1-0, v1-1-1-0, metatarsus v2-2-3; leg III—femur p1-1-1-1, r0-1-0-0, tibia p0-1-1-0, v1-2-1, r0-1-1-0, metatarsus p1-2-2, v2-2-2, r1-1-2; leg IV—femur d1-0-0, tibia v2-2-2, metatarsus p0-1-2, v1-2-2-2, r1-1-2. Scopulae: strong ventral beneath tarsi I–IV and metatarsus I and II and apices of metatarsi III and IV. Leg measurements: I:  $5.90 + 2.70 + 5.10 + 4.10 + 2.30 = 20.10$ ; II:  $5.10 + 2.50 + 4.10 + 3.60 + 2.10 = 17.40$ ; III:  $4.00 + 2.10 + 2.50 + 3.40 + 1.90 = 13.90$ ; IV:  $5.70 + 2.30 + 4.80 + 5.50 + 2.40 = 20.70$ ; palpus:  $2.90 + 1.30 + 1.50 + \text{NA} + 2.50 = 8.20$ . Leg formula 4123. **Female genitalia:** epigynal plate with median lobe surrounded by depressed atrium (Fig. 75 D), plate width 1.28 times length; atrium sides concave, atrium width 1.35 times atrium length; epigynum length 1.35 times atrium length, atrium width 0.78 times epigynum width; atrium width at side of ML equals ML width; atrium and ML extend as lobe posteriad of epigastric groove (Fig. 75 D); median lobe triangular, wider at base, median lobe length 1.85 times width, ML length equals atrium length, 0.69 times epigynal length; lateral lobes narrow, atrium width 8.75 times LL width; copulatory openings beneath anterolateral margins of atrium. Vulva (Fig. 75 E) with spermathecal ducts making a large lateral copulatory duct, anteriorly two narrow spirals, and a posteriorly a lobate base, vulva length 0.62 times width, vulva width 5.25 times distance between fertilization ducts.

**Variation.** Unknown: only the holotype female of *Uduba orona* is known.

**Material examined.** MADAGASCAR: *Fianarantsoa Province*: ca. 38 km S Ambalavao, Andringitra Reserve, on ridge E of Volotsangana River, camp #4, 22°11'39"S, 46°58'16"E, elev. 1625m, ex soil sample, 12–13 December 1993, S. Goodman, (holotype, CASENT9006101, 1♀, FMNH).

**Natural history.** The holotype female of the ecribellate *Uduba orona* was collected from soil in a montane rainforest.

**Distribution.** *Uduba orona* are known only from the type locality in montane rainforest at the Andringitra Reserve in far southern Madagascar (Maps 4, 15).

### *Uduba platnicki*, new species

Figures 17A, 19 B, 28 E, 53 A–C, 76 G, H, 82 A, B, Maps 2, 13.

“*Uduba sp.*,” Polotow et al. (2015: 157), voucher.

**Type material.** Holotype male (CASENT9006021) from rainforest at 700m elevation in Marojejy Reserve, 14°26'S, 49°45'E, Antsiranana Province, Madagascar, collected 10–16 November 1993 by S. Larcher, deposited in USNM. Paratype female (CASENT9030253) from rainforest at 195m elevation in Mikira Forest, 15.120°S, 49.360°E, collected 10–12 December 2008 by



F. Alvarez-Padilla and H. Wood, deposited in CAS.

**Etymology.** The species epithet is a patronym in honor of Dr. Norman I. Platnick, premier spider taxonomist of the late 20<sup>th</sup> and early 21<sup>st</sup> centuries and one of the most prolific spider taxonomists in history. He was also a key theorist of cladistics and vicariance biogeography and showed us how a proper, cladistic classification of spiders revealed much of their deep history and biogeography. Modern studies of Madagascar spider taxonomy began with his visit to France in the 1980's to study Renaud Paulian's collection from the grand island; this led to the recognition that the mysterious genus *Gallieniella* Millot, 1947 (Gallieniellidae) was in fact one of the Gnaphosoidea, a group close to Platnick's heart, and also led to the loan to Griswold of a truly bizarre unidentified specimen with huge male genitalia, which turned out to be the first recognized of many species of the Madagascar endemic genus *Ambohima* Griswold, 1990 (Phyxelididae). Present and future generations will be forever indebted to Norm Platnick's mentoring and generosity, and to his prolific and pioneering research.

**Remarks.** The paratype female of this species was used as the *Uduba* voucher in the total evidence phylogeny of Polotow *et al.* (2015), i.e., voucher, "Uduba sp. KM225230 KM225129 KM225078 KM225178 CAS 9030253, [HW0803], which was represented by figures on page 157: 22C, D (SEM of vulva, dorsal view)." Based on their phylogenetic results, Polotow *et al.* (2015: 137–139) stated that "*Uduba* Simon, 1880, *Raecius* Simon, 1892, *Zorodictyna* Strand, 1907 and three other undescribed species from Madagascar form a well-supported clade ([their] figs 1, 6), which appears in all the analyses with different methods or weight schemes. These genera are currently placed in Zorocratidae, but do not appear closely related to the type species of the family; *Zorocrates fuscus* Simon, 1888. Udubids are recovered in all the total-evidence analyses (Figs 1–3, 8) and the clade is supported by several homoplastic synapomorphies ([their] fig. 6). *Zorocrates* Simon, 1888 lacks these udubid synapomorphies. Udubids also appear in almost all partitioned analyses of Bayesian inference and implied weights of concavity  $k = 6$  ([their] fig. 8). We suggest raising this taxon to family level." They also stated (Polotow *et al.*, 2015: 153) "*Udubidae* is proposed as a new family including the clade 25 formed by former zorocratid genera *Uduba*, *Raecius* and *Zorodictyna*, plus the south Asian genus *Campostichomma*. These do not cluster with the zorocratid type species *Zorocrates fuscus*".

**Diagnosis.** *Uduba platnicki* belong to Group I.a, the *Uduba dahli* group (Map 13) of Group I, the Epigynal atrium group. They are ecribellate, large but still smaller than *Uduba kavanaughii*, males less than 20mm, females less than 25mm total length. Males (Figs. 53 A–C) can be distinguished from those of other ecribellate *Uduba* spp. that have the apex of TA3 screw-shaped by having the TA2 a small, simple mound (Fig. 28 E) (in *U. kavanaughii* the TA2 is a small, blunt blade with a median longitudinal ridge, Fig. 28 F). Females can be distinguished from those of other ecribellate *Uduba* spp. that have an epigynal plate with median lobe surrounded by depressed atrium by having the epigynal plate short posteriad of atrium, ML broad (Fig. 76 H) and the ML with a broad atrial side plate (AtSp) on each side, rendering the atrium as a crescent-shaped depression on each side.

**Description.** **Male** (Holotype): Total length 17.04. Markings typical of *Uduba*. Carapace 10.29 long, 7.29 wide, 4.00 high; clypeus 0.64 high. Eye diameters: AME 0.36, ALE 0.38, PME 0.41, PLE 0.43. Chelicerae 4.86 long; sternum 4.79 long, 3.57 wide; labium 2.39 long; palpal coxae 3.68 long. **Ratios**—carapace length / width = 1.40, carapace height / width = 0.55, PER / carapace width = 0.70, PER / OAL = 2.54, PER / AER = 1.30, OAL / OQL = 1.05, OQP / OQA = 1.11, clypeus height / AME = 1.80, cheliceral length / clypeus height = 7.56, sternum length / width = 1.34, palpal coxa length / width = 2.64, femur I length / carapace width = 1.45, metatarsus I length / carapace width = 1.61, femur IV length / carapace width = 1.45, cymbium length / carapace width

= 0.67, cymbium length / palpal patella length = 3.09, cymbium length / palpal tibia length = 2.83, cymbium length / palpal femur length = 1.17, palpal tibia length / palpal patella length = 1.09. With a colulus. Spination: palpus—femur d0-0-1, p0-0-1, r0-0-1; leg I—femur d1-1-1, p0-1-2, r0-1-0-1, tibia p0-1-1-0, v2-2-2-2, r0-1-1-0, metatarsus p1-1-0, v2-2-3, r1-1-0; leg II—femur d1-1-0-1, p0-1-2, r0-1-0-1, patella p1, tibia d0-0-1-0, p0-1-1-0, v2-2-2-2, r0-1-1-0, metatarsus p1-1-0, v2-2-3, r1-1-0; leg III—femur d1-1-1, p0-1-1-1, r0-1-1-1, tibia d0-0-1-0, p0-1-1-0, v2-2-2, r0-1-1-0, metatarsus d0-1-0, p1-1-2, v2-2-2, r1-1-2, tarsus v0-1-0; leg IV—femur d1-1-0-1, p0-0-1-1, r0-0-0-1, tibia d0-0-1-0, p0-1-1-0, v2-1-2, r0-1-1-0, metatarsus p1-1-2, v2-2-2, r1-1-2. Scopulae: cymbium, apicodorsal; strong beneath all tarsi and beneath metatarsi II and III, and beneath apices of metatarsi III and IV. Leg measurements: I:  $10.57 + 4.00 + 10.14 + 11.71 + 5.29 = 41.71$ ; II:  $9.29 + 3.86 + 8.43 + 9.71 + 4.57 = 35.86$ ; III:  $7.57 + 3.14 + 5.14 + 8.29 + 3.71 = 27.86$ ; IV:  $10.57 + 3.29 + 9.29 + 13.57 + 5.00 = 41.71$ ; palpus:  $4.14 + 1.57 + 1.71 + \text{NA} + 4.86 = 12.29$ . Leg formula [1=4]23. **Male palp** (Figs. 53 A–C): palpal tibia 0.36 times cymbial length, RTA small, broad, triangular (Fig. 53 C), RTA length 0.30 tibia, RTA length equals width, apex slightly curved, with a sharp point, VTA length 1.60 times width, short, conical (Fig. 53 B), length 0.27 tibia width; tibia lacks stout spines; tegulum convex (Fig. 53 C), without ridge, tegulum length 1.02 times width; TA1 extends distad of tegulum apex, TA1 extends past TA3 apex by 1.22 times tegulum length; TA3 very large, screw-shaped with subapical grooves, TA3 extends apicad of TA2 by 1.14 tegulum length, TA2 a small, simple mound, hidden behind TA3 apex (Fig. 28 E); MA simple, small (Figs. 53 A, C) length (including apical processes) 0.56 times width, MA length 0.21 tegulum length, width 0.38 tegulum width, origin at 0.395 tegulum length, MA at 0.33 tegulum length from tegulum apex; conductor fan entire. **Female** (Paratype, CASENT9030253): Total length 22.00. Markings typical of *Uduba*. Carapace 12.00 long, 8.20 wide, 5.30 high; clypeus 0.90 high. Eye diameters: AME 0.42, ALE 0.44, PME 0.36, PLE 0.38. Chelicerae 6.00 long; sternum 4.50 long, 3.70 wide; labium 2.60 long; palpal coxae 3.70 long. **Ratios**—carapace length / width = 1.46, carapace height / width = 0.65, PER / carapace width = 0.45, PER / OAL = 3.68, PER / AER = 1.35, OAL / OQL = 1.06, OQP / OQA = 1.10, clypeus height / AME = 2.14, cheliceral length / clypeus height = 6.67, sternum length / width = 1.22, palpal coxa length / width = 2.06, femur I length / carapace width = 1.06, metatarsus I length / carapace width = 0.79, femur IV length / carapace width = 1.04, palpal tarsus length / carapace width = 0.57, palpal tibia length / palpal patella length = 2.14, palpal tarsus length / palpal tibia length = 1.88, palpal tarsus length / palpal femur length = 1.12, palpal tibia length / palpal patella length = 1.14. With a colulus. Spination: palpus—femur d0-0-2, tibia p1-0, tarsus d2-0, p0-1-1; leg I—femur d0-1-0-1, p0-0-1, tibia v2-2-2-2, metatarsus p0-0-1-0, v2-1-1-2-1; leg II—femur d2-0-0-2, patella p1, tibia p0-1-1-0, v2-2-2-2, metatarsus v2-2-1-0-0; leg III—femur d0-1-0-1, p0-1-1-0, r0-1-1-0, tibia d0-1-0, p0-1-1-0, v2-2-2, r0-1-1-0, metatarsus p1-2-2, v2-2-2, r1-1-2, tarsus v0-1-0; leg IV—femur d1-1-0-1, p0-0-1, r0-0-1, tibia p0-1-1-0, v2-2-2, r0-1-1-0, metatarsus p1-2-2, v2-2-1-2, r2-2-2. Scopulae: strong ventral beneath tarsus-tibia I, tarsus, metatarsus and apex of tibia II, beneath tarsi and metatarsi III and IV. Leg measurements: I:  $8.70 + 3.80 + 7.20 + 6.50 + 4.00 = 30.20$ ; II:  $7.20 + 3.50 + 6.20 + 6.00 + 3.50 = 26.40$ ; III:  $6.40 + 3.20 + 3.60 + 5.50 + 3.10 = 21.70$ ; IV:  $8.50 + 3.50 + 6.90 + 8.50 + 3.70 = 31.10$ ; palpus:  $4.20 + 2.20 + 2.50 + \text{NA} + 4.70 = 13.60$ . Leg formula 4123. **Female genitalia**: epigynal plate with median lobe surrounded by depressed atrium, atrium with shallow plate beside ML (AtSp) and forming deep sulci laterally (Fig. 76 H), epigynal plate width 1.42 times length; atrium sides weakly concave, atrium broad, width 0.81 times epigynum width, atrium width 1.81 times atrium length; epigynum length 1.58 times atrium length; atrium lateral plate width 0.81 times ML width, atrium lateral sulcus width 0.42 times ML width; atrium arises just anterior of epigastric groove, atrium origin at 0.18 of epigynal plate length, ML apex narrow, arises just posterior

ad of atrium apex, median lobe broad, widest at base, median lobe length 0.94 times width, ML length 0.57 times epigynal length; lateral lobes narrow, atrium width 13.80 times LL width; copulatory openings appear to be beneath the anterior notch of the atrium. Vulva (Figs. 76 H, 82 A, B) with spermathecal ducts making three, loose, longitudinal curves, vulva length 0.73 times width, vulva width 5.28 times distance between fertilization ducts.

**Variation.** *Male* (N = 5): Total length = 14.80–18.00, carapace length / width = 1.28–1.48, carapace height / width = 0.54–0.70, PER / carapace width = 0.35–0.70, PER / OAL = 2.54–3.31, PER / AER = 1.30–1.57, OAL / OQL = 1.00–1.12, clypeus height / AME = 1.42–2.57, cheliceral length / clypeus height = 4.60–7.80, sternum length / width = 1.25–1.40, palpal coxa length / width = 2.64–4.25, femur I length / carapace width = 1.31–1.48, metatarsus I length / carapace width = 1.34–1.65, femur IV length / carapace width = 1.35–1.50, cymbium length / carapace width = 0.63–0.67, cymbium length / palpal patella length = 2.96–3.20, cymbium length / palpal tibia length = 2.67–2.96, cymbium length / palpal femur length = 1.08–1.23, palpal tibia length / palpal patella length = 1.00–1.12. *Female* variation is unknown.

**Material examined.** MADAGASCAR: *Antsiranana Province*: Forêt d'Anabohazo, 21.6 km 247°WSW Maromandia, 14°18'32"S, 47°54'52"E, elev. 120m, malaise trap in tropical dry forest, 11–16 March 2001, Fisher-Griswold Arthropod Team, [BLF3336] (CASENT9007417, 1♂, CAS); Marojejy Reserve, 8.4 km NNW Manantenina, 14°26'S, 49°45'E, 700m elevation, 10–16 November 1993, C. Griswold, J. Coddington, N. Scharff, S. Larcher, R. Andriamasimanana [SL.12.LDN] (Holotype, CASENT9006021, 1♂, USNM), R. N. de Marojejy, 10 km NW Manantenina, along tributary of Manantenina River, Camp #2, 14°26.0'S, 49°44.7'E, elev. 775m, relatively undisturbed lowland-montane rainforest, pitfall, 14–23 October 1996, S. Goodman (CASENT9064660, 1♂, FMNH), R. N. de Marojejy, 8 km NW Manantenina, along tributary of Manantenina River, relatively undisturbed lowland forest, Camp #1, pitfall, 14°26.2'S, 49°46.5'E, elev. 450m, 4–13 October 1996, S. Goodman (CASENT9064658, 1♂, FMNH), (CASENT9064653, 1♂, FMNH); 6.5 km SSW Befingotra, Res. Anjanaharibe-Sud, 14°45'S, 49°30'E, elev. 875m, 19 October 1994, B.L. Fisher et al. (CASENT9006020, 1♂, CAS). *Toamasina Province*: Mikira forest, 2.5 hour hike from Andaparaty, 29 km N Maroantsetra, 15.1202°S, 49.3605°E, elev. 195m, 10–12 December 2008, F. Alvarez-Padilla and H. Wood [HW0803] (paratype, CASENT9030253, 1♀, CAS).

**Natural history.** The species *Uduba platnicki* has been collected in lowland to mid-elevation rainforest, from 195–875m elevation. The spiders are ecribellate; nothing is known of their retreats or other uses of silk.

**Distribution.** *Uduba platnicki* are known from mountain rainforest in northeastern Madagascar (Maps 2, 13).

### *Uduba pseudoevanescens*, new species

Figures 7 A, 8 B, 11 C, 20 C, 54 A–C, 71 A, B, 80 J, Maps 4, 16.

**Type material.** Holotype female (CASENT9006008) from Périnet, 18°55'S; 48°25'E, Toamasina Province, Madagascar, collected 1–3 August 1992, by V. and B. Roth, deposited in California Academy of Sciences. Paratype female (CASENT9006005), same data, also in CAS. Paratype females from Ranomafana in Fianarantsoa Province, Madagascar, collected 19–20 July 1992 by V. and B. Roth (CASENT9006004), deposited in MCZ, (CASENT9006005) collected 5 March 1992, deposited in CAS. Paratype male (CASENT9006006) collected at 57 km Route d'Anosibe de Moramanga, September 1953 by J. Millot, deposited in MNHN Paris.

**Etymology.** The species epithet refers to the similarity of this species to the ecribellate *Calamistrula evanescens* Dahl 1901, whereas this new species *Uduba pseudoevanescens* has a divided cribellum.

**Diagnosis.** *Uduba pseudoevanescens* belong to Group II, the Epigynum lateral projection group, or *Uduba evanescens* group (Map 16). Males (Figs. 54 A–C) can be distinguished from those of other *Uduba* species except *U. evanescens* and *U. rakotofrah* in that the palp has a notched MA and the pointed TA2 that extends far apicad but differs from *U. rakotofrah* in that TA3 and conductor extend apicad of all processes (in *U. rakotofrah* the TA2 extends far apicad, Figs. 57 A–C), TA3 is large and swollen (small and hidden in *U. rakotofrah*) and the basal lobe of the MA is entire with a concave margin (deeply forked in *U. rakotofrah*). The females have the epigynum of the typical “*Calamistrula*” type, or *Uduba evanescens* group (Map 16), with large, ear-like lobes extending laterally of the median sector (Figs. 71 A, 80 J). The lateral lobes are laterally rounded and larger than those on the epigyna of species *U. goodmani* (Figs. 77 A, C) and *U. volana* (Figs. 77 D, E). The genitalia of *Uduba evanescens* (Fig. 80 G) and *U. pseudoevanescens* (Fig. 80 J) are nearly identical and not diagnostic, but *U. evanescens* is cribellate (Fig. 20 D) and *U. pseudoevanescens* has a divided cribellum (Fig. 20 C) or a vestige in the adult male.

**Description.** **Male** (Paratype, CASENT9006006): Total length 13.29. Markings as in Figs. 8 B, 11 C. Carapace 6.79 long, 4.93 wide, 2.00 high; clypeus 0.29 high. Eye diameters: AME 0.18, ALE and PME 0.27, PLE 0.34. Chelicerae 3.07 long; sternum 3.39 long, 2.43 wide; labium 1.43 long; palpal coxae 2.11 long. **Ratios:** carapace length / width = 1.36, carapace height / width = 0.41, PER / carapace width = 0.97, PER / OAL = 2.53, PER / AER = 1.24, OAL / OQL = 1.23, OQP / OQA = 1.03, clypeus height / AME diameter width = 1.07, cheliceral length / clypeus height = 10.75, sternum length / width = 1.40, palpal coxa length / width = 2.19, femur I length / carapace width = 1.30, metatarsus I length / carapace width = 1.29, femur IV length / carapace width = 1.30, cymbium length / carapace width = 0.65, cymbium length / palpal patella length = 2.81, cymbium length / palpal tibia length = 3.00, cymbium length / palpal femur length = 1.22, palpal tibia length / palpal patella length = 0.94. Divided cribellum. Spination: palpus—femur d1-1-1, p0-0-2, patella p0-1-0, tibia p2-0-0; leg I—femur d1-1-1, p0-1-2, r0-1-0-1, tibia p0-1-1-0, v2-2-2-2, r0-1-1-0, metatarsus p1-1-1-1, v2-2-1, r1-0-1-0; leg II—femur d1-1-1, p1-1-2, r0-1-0-1, patella r1, tibia p0-1-1-0, v2-2-2-2, r0-1-1-0, metatarsus p1-1-0-1, v2-2-2, r1-1-0; leg III—femur d1-1-0-1, p0-1-1-1, r0-1-1-1, tibia d0-1-0, p0-1-1-0, v2-2-2, r0-1-1-0, metatarsus p1-1-1-2, v2-2-2, r1-2-2; leg IV—femur d1-1-0-1, p1-0-0-1, r0-0-0-1, tibia d0-0-1-0, p0-1-1-0, v2-2-2, r0-1-1-0, metatarsus d0-1-0, p1-1-2, v2-2-1, r1-2-2. Scopulae: cymbium, apicodorsal; tarsi and apical metatarsi I–II, ventral. Leg measurements: I:  $6.43 + 2.57 + 6.21 + 6.36 + 3.57 = 25.14$ ; II:  $5.50 + 2.36 + 5.21 + 5.50 + 3.00 = 21.57$ ; III:  $4.64 + 1.86 + 3.36 + 4.43 + 2.36 = 16.64$ ; IV:  $6.43 + 2.29 + 5.64 + 6.57 + 2.86 = 23.79$ ; palpus:  $2.64 + 1.14 + 1.07 + \text{NA} + 3.21 = 8.07$ . Leg formula 1423. **Male palp** (Figs. 54 A–C): palpal tibia 0.31 times cymbial length, RTA triangular (Fig. 54 C), length 0.34 tibia length, length 1.375 times width, apex narrowed, sharply-pointed, VTA long, stout, cylindrical, upturned (Fig. 54 B), length 2.375 times width, length 0.459 times tibia width; tibia with slender spines but lacking stout spines; tegulum convex, with retroapical indentation, without ridge, tegulum length 1.13 times width; TA1 ends just before tegulum apex, TA2 and TA3 extend beyond TA1 and tegulum apex, TA3 a convex, blunt lobe, extending farthest apicad of all tegular processes (Fig. 54 A), TA2 a large, pointed, curved triangle; MA complex (Figs. 54 A, C), with proximal blunt lobe, median transverse notch, and apical curved lobe, origin at 0.17 times tegulum length, tegulum apex at 0.38 tegulum length from MA apex, length (including apical processes) 0.85 times width, MA large, length 0.415 times tegulum length, width 0.55 tegulum width (Figs. 54 A–C); tegulum with low apical mound that partially covers base of TA3 (Fig. 54 A); conductor fan convex. **Female** (Holotype): Total length 12.80. Markings as in Fig. 7 A. Carapace 6.20 long, 4.10 wide, 2.60 high; clypeus 0.40 high. Eye diameters: AME 0.20, ALE 0.26, PME 0.24, PLE 0.30. Chelicerae 3.00 long; sternum 2.70 long, 2.00 wide; labium 1.40 long; palpal coxae 2.00 long. Divided cribellum

(Fig. 20 C). Spination: (Holotype): palpus–femur d0-1-2, patella p0-1-0, tibia p2-0, r1-0, tarsus p2-1; leg I–femur d1-0-0, p0-0-2, tibia v2-2-2-2, metatarsus v2-2-3; leg II–femur d0-1-0-0, p0-0-0-1, tibia v1-1-1-2, metatarsus v2-2-3; leg III–femur d1-0-0-1, p0-1-0-1, r0-1-1-0, tibia d0-0-1-0, p0-1-1-0, v2-2-2, r0-1-1-0, metatarsus p0-0-2, v2-2-2, r0-0-2; leg IV–femur d0-1-1-0, tibia v1-1-2, r0-1-1-0, metatarsus p0-0-2, v1-1-2-2, r0-0-2. Scopulae: ventral on tibia–tarsus I and II, metatarsus–tarsus III and IV and apical metatarsus III and IV. Leg measurements: I:  $4.40 + 2.30 + 3.40 + 3.00 + 1.80 = 14.90$ ; II:  $3.80 + 2.00 + 3.00 + 2.80 + 1.70 = 13.30$ ; III:  $3.00 + 1.50 + 1.90 + 2.10 + 1.50 = 10.00$ ; IV:  $4.30 + 1.90 + 3.40 + 3.60 + 1.80 = 15.00$ ; palpus:  $2.10 + 1.10 + 1.10 + \text{NA} + 2.50 = 6.80$ . Leg formula 4123. **Female genitalia** (Forêt Marovato, MNHN, CASENT9006007): epigynal plate without depressed atrium, lateral lobes extending to sides forming earlike lobes (Figs. 71 A, 80 J), plate width 2.95 times length; width between bases of LL 0.55 times epigynum width; lateral ears wide, (LL side) width 0.19 times width epigynum, arising far from epigastric furrow, lateral ears (LL side) width 0.92 times LL side length; median lobe a flat plate with longitudinal, weakly convex median hoods, with copulatory openings beneath lateral hoods, close together, distance between copulatory openings 0.16 times epigynum width, CO origin at 0.475 of epigynum length. Vulva (Figs. 71 B, 80 J) with spermathecal ducts forming three loose, longitudinal loops, vulva length 0.54 times width, fertilization ducts well separated, vulva width 5.33 times distance between FD.

**Variation.** Male variation is unknown: only a single male is known. **Female** (N = 5): Total length 9.30–14.50; carapace length / width = 1.46–1.58, carapace height / width = 0.54–0.66, PER / carapace width = 0.46–0.48, PER / OAL = 2.91–3.26, PER / AER = 2.91–3.26, OAL / OQL = 1.07–1.21, OQP / OQA = 1.06–1.13, clypeus height / AME = 1.00–1.92, cheliceral length / clypeus height = 6.60–10.50, sternum length / width = 1.25–1.38, palpal coxa length / width = 2.00–2.56, femur I length / carapace width = 1.00–1.14, metatarsus I length / carapace width = 0.70–0.86, femur IV length / carapace width = 0.98–1.09, palpal tarsus length / carapace width = 0.44–0.61, palpal tibia length / palpal patella length = 1.75–2.27, palpal tarsus length / palpal tibia length = 1.56–2.27, palpal tibia length / palpal patella length = 1.00–1.20. Female genitalia as in Figs. 71 A, B, 80 J.

**Material examined.** MADAGASCAR: *Province not specified* ["Madagascar E.": F. de Ankaraoka, November 1946, J. Millot, (CASENT9006002, 1♀, MNHN); F. Marovato, November 1946, J. Millot (CASENT9006007, 1♀, MNHN), "Sandragate (Battage) bord du torrent" 57 km Route d'Anosibe de Moramanga, September 1953, J. Millot, MNHN Paris (Paratype, CASENT9006006, 1♂, MNHN). *Fianarantsoa Province*: Ranomafana, ca. 21°12'S; 47°27'E, 19–20 July 1992, V. and B. Roth (Paratype, CASENT9006004, 1♀, MCZ); Ranomafana N. P., township of Ranomafana, 5 March 1992, V. Roth (Paratype, CASENT9006003, 1♀, CAS). *Toamasina Province*: Périnet, 18°55'S; 48°25'E, 1–3 August 1992, V. and B. Roth (Holotype, CASENT9006008, 1♀), (Paratype, CASENT9006005, 1♀, CAS).

**Natural history.** Natural history data are few, but most collections of *Uduba pseudoevanescens* are from forested areas. At least one female was collected from an "... open tube, excavated in soil and rotting wood" (V. and B. Roth, label data) suggesting that these cribellate spiders dig burrows and use silk to line them.

**Distribution.** The species *Uduba pseudoevanescens* is distributed along the eastern side of the escarpment from Ranomafana in Fianarantsoa Province in the south to Ankaraoka in the north (Maps 4, 16). There is one case of sympatry with the closely related ecribellate species *U. evanescens* at Ranomafana: females of *U. pseudoevanescens* have been collected there on 5 March and 19–20 July 1992 by V. and B. Roth, whereas we have collections of *U. evanescens* from the Ranomafana area virtually throughout the year.



*Uduba rajery*, new species

Figures 8 E, 55 A–C, 56 A–F, Maps 9, 19.

**Type material.** Holotype male (CASENT9026393) from a yellow pan trap in littoral rainforest at 20m elevation in Forêt Ambohidena, Ile Sainte Marie, Toamasina Province, Madagascar, collected 21–24 November 2005 by Brian L. Fisher *et al.*, deposited in CAS.

**Etymology.** The species epithet is patronym in honor of the Malagasy musician Rajery, born Germain Randrianrisoa, who is a player of the bamboo tube zither (valiha) and who founded the modern valiha orchestra. In spite of a childhood accident that cost him the fingers of one hand he developed a unique and memorable style of playing the valiha, invented notation for this instrument, and is one of Madagascar's finest recording artists.

**Diagnosis.** *Uduba rajery* belong to Group V, the *Uduba rajery* group (Map 19). Males can be distinguished from those of other *Uduba* by the form of the male palp (Figs. 55 A–C, 56 A–F), with a thick, swollen VTA on the tibia, the spine-like TA3 extending through a notch at the apex of the tegulum, and the large, triangular MA: *Uduba rajery* may be distinguished from *U. rakotozafy* by having the MA apex with two spikes (Figs. 55 C, 56 B, D, E) (*U. rakotozafy* has an apical lobe and spike, Fig. 58 A). Females of *Uduba rajery* are unknown.

**Description.** Male (holotype): Total length 6.00. Markings as in Fig. 8 E, with a striking pattern of black legs, tan coxae and trochanters, and black lateral stripes on a tan carapace. Carapace 3.80 long, 2.60 wide, 1.60 high; clypeus 0.25 high. Eye diameters: AME, PME and PLE 0.16, ALE 0.15. Chelicerae 1.70 long; sternum 2.00 long, 1.40 wide; labium 0.90 long; palpal coxae 1.30 long. **Ratios**—carapace length / width = 1.46, carapace height / width = 0.62, PER / carapace width = 0.39, PER / OAL = 2.83, PER / AER = 1.28, OAL / OQL = 1.06, OQP / OQA = 1.11, clypeus height / AME = 1.56, cheliceral length / clypeus height = 6.80, sternum length / width = 1.43, palpal coxa length / width = 2.60, femur I length / carapace width = 1.23, metatarsus I length / carapace width = 1.27, femur IV length / carapace width = 1.27, cymbium length / carapace width = 0.62, cymbium length / palpal patella length = 3.20, cymbium length / palpal tibia length = 2.29, cymbium length / palpal femur length = 1.23, palpal tibia length / palpal patella length = 1.40. Cribellum divided. Spination: palpus—femur d1-0-1, patella d0-1; leg I—femur d1-1-1, p0-0-2, tibia p0-1-1-0, v2-2-2, r0-1-1-0, metatarsus p1-1-1, v2-2-2, r1-1-1; leg II—femur d1-1-1, p0-0-1, r0-0-1, tibia d0-1-1-0, p0-1-1-0, v2-2-2-2, r0-1-1-0, metatarsus p1-1-1, v2-2-3, r1-1-1; leg III—femur d1-1-1, p0-1-1-0, r0-1-1-0, tibia d0-0-1-0, p0-1-1-0, v2-2-2, r0-1-1-0, metatarsus d0-1-0, p1-1-2, v2-2-2, r1-1-2, tarsus v0-1-0; leg IV—femur d1-1-1, p0-0-1, r0-0-1, patella r1, tibia d0-1-0, p0-1-1-0, v2-2-3, r0-1-1-0, metatarsus d0-1-0, p1-1-1, v2-2-2, r1-1-1. Scopulae: cymbium, apicodorsal (Figs. 56 A, C); very weak beneath all tarsi. Leg measurements: I: 3.20 + 1.40 + 3.10 + 3.30 + 2.20 = 13.20; II: 2.80 + 1.20 + 2.50 + 2.70 + 1.60 = 10.80; III: 2.40 + 1.10 + 1.60 + 2.20 + 1.20 = 8.50; IV: 3.30 + 1.20 + 2.80 + 3.60 + 1.70 = 12.60; palpus: 1.30 + 0.50 + 0.70 + NA + 1.60 = 4.10. Leg formula 1423. **Male palp:** palpal tibia 0.52 times cymbial length, RTA broad, very short, sharply-curved to ventrad (Fig. 55 C), RTA length 0.09 tibia length, length 0.44 times width, VTA unique, large, swollen, transversely wider than long and truncate apically (Figs. 55 B, C, 56 A), length 0.705 times width, length 0.44 tibia width; tibia lacking stout spines; tegulum convex, without ridge, tegulum length 0.98 times width; TA1 serrate medially and with pointed apex, extends distad of tegulum apex, TA1 extends slightly past TA3 apex; TA3 elongate with recurved apex extending through notch at tegular anterior margin (Figs. 56 B, F), TA3 extends apicad of TA2 by 1.25 tegulum length, TA2 a mound partly forming the notch from which the TA3 apex emerges and partially covering mesal margin of MA (Figs. 55 B, 56 B, E); MA origin at 0.26 times tegulum length, MA apex extends distad of tegulum apex, length (including apical processes) 2.00 times width, MA very large, length 0.81 times tegulum length, width 0.395 times tegulum width, oval

with a swollen, rounded base and with retrolateral and prolateral acutely-pointed apical projections (Fig. 55 B, 56 D, E); conductor fan entire. **Female:** Unknown.

**Variation.** Unknown: the species *Uduba rajery* is only known from one male, the holotype.

**Material examined.** MADAGASCAR: *Toamasina Province*: Ile Sainte Marie, Forêt Ambohidena, 22.8 km 44°NW Ambodifotatra, 16°49'28"S, 49°57'51"E, elev. 20m, yellow pan trap, littoral rainforest, 21–24 November 2005, B. L. Fisher *et al.* [BLF12839] (Holotype, CASENT9026393, 1♂, CAS).

**Natural history.** The lone specimen of *Uduba rajery* was collected in littoral rainforest. Like all adult male *Uduba* it was wandering when trapped. The vestige of a divided cribellum on the male suggests that *U. rajery* females deploy cribellate sticky silk, but we know nothing of their behavior.

**Distribution.** *Uduba rajery* is known only from the type locality on Ile Sainte Marie, off the northeast coast of Madagascar (Maps 9, 19).

### *Uduba rakotofrah*, new species

Figures 29 B, 57 A–C, Maps 9, 16.

**Type material.** Holotype male (CASENT9062795) and two paratype males (CASENT9062794), from a malaise trap in rainforest at 540m elevation in the Anosyenne Mts., Toliara Province, Madagascar, collected 21–24 February 2015 by Brian Fisher and Flavia Estevez, deposited in CAS.

**Etymology.** The species epithet is patronym in honor of the Malagasy musician Rakotofrah, born Philibert Rabezosa. He was a renowned flautist and composer of music of the central highlands of Madagascar. He became the most acclaimed 20<sup>th</sup> century performer of the sodina flute, one of the oldest traditional instruments on the island and his picture with flute is even featured on Madagascar's 1000 ariary banknote and 1500 FMG postage stamp. Through frequent international concerts and music festival performances, he promoted the music of the highlands of Madagascar and became one of the most famous Malagasy artists, both within Madagascar and on the world music scene.

**Diagnosis.** *Uduba rakotofrah* belong to Group II, the Epigynum lateral projection group, or *Uduba evanescens* group (Map 16). Males can be distinguished from those of other *Uduba* spp. except *U. pseudoevanescens* and *U. evanescens* in that the palp (Figs. 57 A–C) has a notched MA and the pointed TA2 that extends far apicad, but differs from those in that TA2 extends apicad of all processes (Fig. 29 B) (in *U. pseudoevanescens* and *U. evanescens* the TA3 and conductor extend as far apical as TA2, Figs. 29 A, 35 A–C, 54 A–C), TA3 is hidden (large and swollen in *U. pseudoevanescens* and *U. evanescens*) and the basal lobe of the MA is deeply forked (entire in *U. pseudoevanescens* and *U. evanescens*). *Uduba rakotofrah* further differ from *U. evanescens* in having a divided cribellum; the latter is ecribellate (Fig. 20 D). Females of *Uduba rakotofrah* are unknown.

**Description. Male** (holotype): Total length 9.00. Markings typical of *Uduba*. Carapace 5.10 long, 3.30 wide, 1.90 high; clypeus 0.25 high. Eye diameters: AME and ALE 0.22, PME 0.20, PLE 0.24. Chelicerae 2.00 long; sternum 2.20 long, 1.80 wide; labium 0.90 long; palpal coxae 1.50 long. Divided cribellum. Spination (holotype): palpus–femur d1-1-1, p0-0-1, r0-0-1; leg I–femur d1-1-1, p0-0-2, r0-1-0-1, tibia d0-0-0-1, p0-1-1-0, v2-2-2-2, r0-1-1-0, metatarsus d1-1-0-0, p0-0-1-1, v2-2-2, r1-1-0; leg II–femur d1-1-1, p0-1-1, r0-0-1-1, patella p1, tibia d0-0-0-1, p0-1-1-0, v2-2-2-2, r0-1-1-0, metatarsus d1-1-0-0, p0-0-1-1, v2-2-2, r1-1-0-0; leg III–femur d1-1-0-1, p0-1-1-0, r0-1-1-0, patella p1, tibia d0-1-0, p0-1-1-0, v2-2-2, r0-1-1-0, metatarsus d0-1-0, p1-1-2, v2-2-2, r1-1-2; leg IV–femur d1-1-0-3, tibia d0-0-1-0, v2-1-2, r0-1-0-0, metatarsus d0-2-2, p1-1-2, v2-2-2, r1-1-2.

Scopulae: cymbium, apicodorsal; legs I–IV, leg scopulae very weak to absent. Leg measurements (holotype): I:  $4.00 + 1.70 + 3.70 + 3.70 + 2.20 = 15.30$ ; II:  $3.50 + 1.60 + 3.20 + 3.40 + 2.00 = 13.70$ ; III:  $3.10 + 1.30 + 2.10 + 2.90 + 1.50 = 10.90$ ; IV:  $4.00 + 1.50 + 3.50 + 4.30 + 2.00 = 15.30$ ; palpus:  $1.50 + 0.70 + 0.80 + \text{NA} + 2.20 = 5.20$ . Leg formula 4=1, 23. **Male palp** (paratype, CASENT9064775) (Figs. 57 A–C): palpal tibia 0.36 times cymbial length, RTA small, triangular, with pointed apex (Fig. 57 A), length 0.19 tibia length, length equals width; VTA very long, cylindrical, upturned (Figs. 57 A, C), length 1.91 times width, length 0.81 times tibia width; tibia lacking stout spines; tegulum convex, without ridge, tegulum length 1.02 times width; TA1 and TA3 extend to tegulum apex, TA2 extends beyond TA1 and tegulum apex (Fig. 57 B), TA3 a convex, blunt lobe, TA2 a large, sharply-pointed triangle, extending farthest apicad of all tegular processes (Fig. 29 B); MA complex, with proximal blunt lobe, median notch, and small apical curved lobe (Figs. 29 B, 57 B), origin at 0.15 times tegulum length, tegulum apex at 0.52 tegulum length from MA apex, length (including apical processes) 1.02 times width, MA length 0.30 times tegulum length, width 0.44 tegulum width; tegulum with apical mound that partially covers base of TA3; conductor fan margin irregular (Fig. 57 C). **Female**: unknown.

**Variation.** Male (N= 3): Total length 8.20–9.00; carapace length / width = 1.51–1.56, carapace height / width = 0.43–0.58, PER / carapace width = 0.41–0.43, PER / OAL = 2.57–2.65, PER / AER = 1.22–1.23, OAL / OQL = 1.08–1.18, OQP / OQA = 1.00–1.13, clypeus height / AME = 1.14–1.36, cheliceral length / clypeus height = 6.67–8.00, sternum length / width = 1.22–1.41, palpal coxa length / width = 2.50–3.00, femur I length / carapace width = 1.14–1.25, metatarsus I length / carapace width 1.06–1.16, femur IV length / carapace width = 1.21–1.29, cymbium length / carapace width = 0.53–0.72, cymbium length / palpal patella length = 2.75–3.29, cymbium length / palpal tibia length = 2.75–3.29, cymbium length / palpal femur length = 1.16–1.47, palpal tibia length / palpal patella length = 1.00–1.14. Female variation is unknown: the species is only known from males.

**Material examined.** MADAGASCAR: *Toliara Province*: Anosyenne Mts., 24°8'24"S, 47°4'27"E, elev. 540m, rainforest, malaise trap, 21–24 February 2015, B. Fisher and F. Estevez [BLF36109] (Holotype, CASENT9062795, 1♂, CAS), (paratypes, CASENT9062795, 1♂ and CASENT9064775, 1♂, CAS).

**Natural history.** Collection records indicate that *Uduba rakotofrah* occurs in low elevation rain forest. Wandering males were collected above the forest floor in a malaise trap. The unknown females of *U. rakotofrah* should have a divided cribellum, but we know nothing of their use of silk.

**Distribution.** The species *Uduba rakotofrah* is known only from the type locality in southern Madagascar (Maps 9, 16).

### *Uduba rakotozafy*, new species

Figures 8 G, 11 E, 29 G, 58 A–C, Maps 9, 19.

**Type material.** Holotype male (CASENT9006024) from forest at 1000m elevation at Parc National Périnet, near Andasibe, Toamasina Province, Madagascar, collected 4–5 November 1993 by C. Griswold, deposited in CAS.

**Etymology.** The species epithet is a patronym in honor of the Malagasy musician Rakotozafy, a legendary player of his own customized *marovany* zither and one of the most celebrated *valiha* players of the twentieth century.

**Diagnosis.** *Uduba rakotozafy* belong to Group V, the *Uduba* rajery group (Map 19). Males can be distinguished from those of other *Uduba* by the form of the male palp, with a thick, swollen VTA on the tibia, the spine-like TA3 extending through a notch at the apex of the tegulum (Fig. 29 G), and the large, triangular MA (Figs. 58 A–C). *Uduba rakotozafy* may be distinguished from

*U. rajery* by having the MA apex with an apical lobe and spike (*U. rajery* has two spikes, Figs. 55 B, 56 E). Females are unknown.

**Description.** Make (Holotype): Total length 9.29. Markings as in Figs. 8 G, 11 E, Carapace 4.86 long, 3.71 wide, 1.57 high; clypeus 0.21 high. Eye diameters: AME 0.14, ALE 0.18, PME 0.20, PLE 0.21. Chelicerae 1.93 long; sternum 2.25 long, 1.61 wide; labium 1.04 long; palpal coxae 1.57 long. **Ratios**—carapace length / width = 1.31, carapace height / width = 0.42, PER / carapace width = 0.84, PER / OAL = 2.64, PER / AER = 1.42, OAL / OQL = 1.27, OQP / OQA = 1.33, clypeus height / AME = 1.50, cheliceral length / clypeus height = 9.00, sternum length / width = 1.40, palpal coxa length / width = 2.59, femur I length / carapace width = 1.10, metatarsus I length / carapace width = 1.10, femur IV length / carapace width = 1.15, cymbium length / carapace width = 0.58, cymbium length / palpal patella length = 3.00, cymbium length / palpal tibia length = 2.73, cymbium length / palpal femur length = 1.15, palpal tibia length / palpal patella length = 1.10. Cribellum divided. Spination: palpus—femur d0-1-1, p0-0-1, r0-0-1, patella p1-0, tibia p1-0; leg I—femur d1-0-1-1, p0-0-2, r0-0-1, tibia p0-1-1-0, v2-2-2-2, r0-1-1-0, metatarsus p1-1-2, v2-2-2, r1-1-2; leg II—femur d1-1-1, p0-1-1-0, r0-1-1-0, tibia d0-0-1, p0-1-1-0, v2-2-2-2, r0-1-1-0, metatarsus p1-1-2, v2-2-2, r1-1-1; leg III—femur d1-1-1, p1-1-2, r1-1-2, tibia d0-1-0-0, p0-1-1-0, v2-2-2, r0-1-1-0, metatarsus d0-1-0, p1-1-2, v2-2-2, r1-1-2, tarsus v0-1-0; leg IV—femur d1-1-1, p1-1-1, r0-0-1, tibia d1-0-1-0, p0-0-1-0, v2-2-2, r0-1-0-0, metatarsus d0-1-0, p1-1-2, v2-2-2, r1-1-2. Scopulae: cymbium, apicodorsal; tarsi I–IV, ventral. Leg measurements: I:  $4.07 + 1.64 + 3.64 + 4.07 + 2.64 = 16.07$ ; II:  $3.57 + 1.57 + 2.93 + 3.21 + 2.07 = 13.36$ ; III:  $3.07 + 1.43 + 1.79 + 2.71 + 1.50 = 10.50$ ; IV:  $4.29 + 1.50 + 3.43 + 4.29 + 2.14 = 15.64$ ; palpus:  $1.86 + 0.71 + 0.79 + \text{NA} + 2.14 = 5.50$ . Leg formula 1423. **Male palp** (Figs. 58 A–C): palpal tibia 0.41 cymbial length, RTA broad, RTA length 0.24 tibia length, length equals width, with bluntly-pointed apex (Fig. 58 C), VTA unique, large, hammer-shaped, transversely wider than long and with apical recurved hook (Figs. 58 A–C), length 0.80 times width, length 0.32 tibia width; tibia lacking a stout retrolateral spine but with slender prolateral spine (Fig. 58 B); tegulum convex, without ridge, tegulum length 0.875 times width; TA1 with subbasal notch and broad apex, extends distad of tegulum apex, TA1 extends past TA3 apex by 1.15 times tegulum length; TA3 elongate with recurved apex extending through notch at tegular anterior margin (Figs. 29 G, 58 A), TA3 extends apicad of TA2 by 1.09 tegulum length, TA2 a small low mound partly forming the notch from which the TA3 apex emerges; MA origin at 0.17 times tegulum length, MA apex extends distad of tegulum apex, MA length (including apical processes) 1.03 times width, MA very large, covering much of tegulum, length 0.83 times tegulum length, width 0.71 times tegulum width, triangular with apical projections, retrolateral blunt and prolateral acutely-pointed (Figs. 29 G, 58 A); conductor fan entire. **Female:** Unknown.

**Variation.** Male. Variation unknown: *Uduba rakotozafy* is only known from one male, the holotype.

**Material examined.** MADAGASCAR: Toamasina Province: Parc National Périnet, near Andasibe, 18°56'S, 48°24'E, elev. 1000m, 4–5 November 1993, J. Coddington, N. Scharff, S. Larcher, C. Griswold, R. Andriamasimanana (Holotype, CASENT9006024, 1♂, CAS).

**Natural history.** The lone specimen of *Uduba rakotozafy* was collected on the ground in rain-forest. The vestige of a divided cribellum on the male suggests that *U. rakotozafy* females deploy cribellate sticky silk, but we know nothing of their behavior.

**Distribution.** The species *Uduba rakotozafy* is known only from the type locality at Parc National Périnet in the central eastern escarpment of Madagascar (Maps 9, 19).

***Uduba rinha*, new species**

Figures 6 D, E, 8 A, 11 D, 29 I, 59 A–C, 71 G, H, 81 B, E, Maps 3, 18.

**Type material.** Holotype male (CASENT9018660) and paratype female (CASENT9082218) collected from pitfall traps at 140m elevation in dry tropical forest at Parc National de Namoroka, Mahajanga Province, Madagascar, 4–8 November 2002, Fisher-Griswold Arthropod Team, deposited in CAS.

**Remarks.** Males of the similar species *Uduba rinha* and *U. irwini* may be distinguished by the TA2 form. Association of the males and females of *U. rinha* is unproblematic in that several were collected together at Parc National de Namoroka. Two similar females, one from Manongarivo (CASENT9006108) and a second from Tsingy de Bemeraha (CASENT9009383), are more difficult to associate with species. Females of *Uduba rinha* have the epigynal plate posterior of the ML smooth or grooved and the CO hidden beneath the ML hood. The female from Manongarivo (CASENT9006108) that has the CO hidden beneath the ML hood is assigned to species *U. rinha*. The female from Tsingy de Bemeraha (CASENT9009383) that has exposed copulatory openings differs from *U. rinha* and is assigned to *U. irwini* (see above).

**Etymology.** The species epithet is a patronym in honor of Mr. Harin'Hala Rin'Ha, entomologist and explorer-naturalist who conducted most of the fieldwork for the Schlinger *et al.*, Malaise Trap Survey of Madagascar arthropods. His efforts have revealed numerous new species of insects and arachnids.

**Diagnosis.** *Uduba rinha* are members of Group IV, the *Uduba rinha* group (Map 18). They have a divided cribellum. Males can be distinguished from those of other *Uduba* except *U. irwini* by the simple, trapezoidal MA (Figs. 59 A–C); *U. rinha* may be distinguished from *U. irwini* by having the TA2 a flexible hook or curlicue (Fig. 29 I) (*U. irwini* has the TA2 an erect, rectangular spike, Fig. 46 B). The females can be distinguished from those of other cribellate *Uduba* by having the epigynum lateral lobes fused medially (Figs. 71 G, 81 B). The females of *U. rinha* have copulatory openings that are hidden beneath the sides of the ML (Figs. 71 G, 81 B); the lone female of *U. irwini* has the copulatory openings exposed just posteriad of the ML (Fig. 71 C).

**Description.** **Male** (Holotype): Total length 10.00. Markings as in Figs. 8 A, 11 D. Carapace 5.50 long, 3.60 wide, 1.70 high; clypeus 0.20 high. Eye diameters: AME 0.16, ALE 0.20, PME 0.22, PLE 0.24. Chelicerae 2.10 long; sternum 2.30 long, 1.80 wide; labium 1.00 long; palpal coxae 1.50 long. Divided cribellum. Spination. (MRAC 174.445): palpus–femur d1-1-1; leg I–femur d0-0-2, p0-1-2, r1-1-1-1, patella p1, r1, tibia d1-0-1-1, p0-1-1-0, v2-2-2-2, r0-1-1-0, metatarsus p1-1-2, v2-2-2, r1-1-1; leg II–femur d1-1-1, p0-1-0-1, r0-1-0-1, patella p1, tibia d0-1-0, p0-1-1-0, v1-2-2, r0-1-0-0, metatarsus p1-1-2, v2-2-2, r1-1-1; leg III–femur d1-1-1, p1-1-1-1, r1-1-1-1, patella r1, tibia d0-1-0, p0-1-1-0, v1-0-2, r0-1-1-0, metatarsus d0-1-0, p1-1-2, v2-2-2, r1-1-2; leg IV–femur d1-1-1, p0-1-0-1, r0-0-0-1, tibia d0-1-0, p0-1-1-0, v2-2-2, r0-1-1-0, metatarsus d0-1-0, p1-1-2, v1-1-1-2-1, r1-2-1. Scopulae: cymbium, apicodorsal; tarsi I–IV, ventral. Leg measurements (Holotype): I:  $4.50 + 2.00 + 4.30 + 4.30 + 2.60 = 17.70$ ; II:  $3.80 + 1.80 + 3.30 + 3.30 + 2.20 = 14.40$ ; III:  $3.20 + 1.40 + 2.00 + 2.50 + 1.60 = 10.70$ ; IV:  $3.20 + 1.80 + 3.30 + 2.60 + 1.60 = 12.50$ ; palpus:  $2.00 + 0.80 + 0.80 + \text{NA} + 2.30 = 5.90$ . Leg formula 1243. **Male palp** (MRAC 174.445): palpal tibia 0.36 cymbial length, RTA long, curved to ventral, RTA length 0.59 times tibia length, length 2.00 times width, with sharply-pointed apex (Fig. 59 C), VTA short, conical, blunt (Figs. 59 A–C), length 1.44 times width, length 0.48 times tibia width; tibia lacking stout spines; tegulum convex, without ridge, tegulum length 1.08 times width; TA1 extends distad of tegulum apex, TA1 extends past TA3 apex by 1.21 times tegulum length; TA3 a transverse hook, TA3 extends apicad of TA2 by 1.175 tegulum length, TA2 small, curlicue-shaped, soft and flexible, extends partially in front of TA3 (Figs. 29 I, 59 A); MA a broad, flat trapezoid, origin at 0.40 times tegulum length,



extends nearly to tegulum apex, tegulum apex at 0.09 tegulum length from MA apex, length (including apical processes) 1.05 times width, MA large, length 0.38 tegulum length, width 0.39 tegulum width (Figs. 59 A, B); conductor fan entire (Fig. 59 C). **Female** (paratype): Total length 8.60. Markings as in Figs. 6 D, E. Carapace 4.80 long, 3.40 wide, 1.90 high; clypeus 0.30 high. Eye diameter: AME 0.14, ALE 0.18, PME 0.20. Chelicera 2.20 long; sternum 2.10 long, 0.80 wide; labium 1.20 long; palpal coxae 1.60 long. Divided cribellum. Spination: palpus—femur d0-1-2, patella p1-0, tibia p2-0, tarsus p2-1; leg I—femur d1-0-0, p0-0-2, tibia v2-2-2-2, metatarsus v2-2-3; leg II—femur d1-0-0, p0-0-1, tibia p0-1-0, v1-1-2, metatarsus p0-1-0, v2-2-3; leg III—femur d1-0-0-1, p1-0-1, r0-1-0, tibia d1-1-0, p0-1-1-0, v1-1-2, r0-1-1-0, metatarsus d1-0-0-0, p1-1-2, v2-2-2, r1-1-2, tarsus v0-1-0; leg IV—femur d1-0-0-0, tibia v1-2-2, r1-0-1, metatarsus p0-0-0-2, v2-1-2-2, r0-0-1-2. Scopulae: ventral on tarsi I–IV and apices of metatarsi I and II. Leg measurements: I:  $3.50 + 1.80 + 2.80 + 2.40 + 1.90 = 12.40$ ; II:  $3.00 + 1.60 + 2.30 + 2.10 + 1.70 = 10.70$ ; III:  $2.50 + 1.20 + 1.30 + 1.70 + 1.30 = 8.00$ ; IV:  $3.50 + 1.60 + 2.70 + 2.80 + 1.50 = 12.10$ ; palpus:  $1.80 + 0.80 + 0.90 + \text{NA} + 1.50 = 5.00$ . Leg formula 1423. **Female genitalia** (paratype): epigynal plate without depressed atrium, plate width 1.32 times length (Fig. 71 G); median lobe and lateral lobes differentiated only in anterior half of plate, distance from posterior margin of ML to epigastric furrow 0.83 times epigynum length; median lobe (Fig. 81 B), a flat plate with lateral margins extending around to posterior, nearly meeting in middle, broad, ML width between bases of LL 0.59 times epigynum width, ML width 4.20 times LL width at sides of ML; median lobe width 0.38 times epigynum width, ML width 0.45 times ML length, with copulatory openings hidden beneath lateral margins of ML (Fig. 71 G), distance between copulatory openings 0.56 times epigynum width, CO origin at 0.70 of epigynum length. Vulva (Fig. 71 H) with spermathecal ducts forming three longitudinal loops, vulva length 0.61 times width, fertilization ducts widely separated, vulva width 2.68 times distance between FD (Fig. 81 E).

**Variation.** **Male** (N= 5): Total length 8.14–10.00; carapace length / width = 1.40–1.54, carapace height / width = 0.42–0.56, PER / carapace width = 0.36–0.81, PER / OAL = 2.48–2.92, PER / AER = 1.31–1.42, OAL / OQL = 1.07–1.15, OQP / OQA = 1.10–1.43, clypeus height / AME = 1.18–1.56, cheliceral length / clypeus height = 8.00–11.60, sternum length / width = 1.28–1.41, palpal coxa length / width = 2.41–3.35, femur I length / carapace width = 1.22–1.26, metatarsus I length / carapace width = 1.17–1.35, femur IV length / carapace width = 0.89–1.45, cymbium length / carapace width = 0.56–0.70, cymbium length / palpal patella length = 2.36–2.91, cymbium length / palpal tibia length = 2.50–2.91, cymbium length / palpal femur length = 0.71–1.15, palpal tibia length / palpal patella length = 0.93–1.09. **Female** (N= 3): Total length 8.60–10.60; carapace length / width = 1.41–1.56, carapace height / width = 0.54–0.62, PER / carapace width = 0.39–0.44, PER / OAL = 3.13–3.19, PER / AER = 1.32–1.39, OAL / OQL = 1.05–1.29, OQP / OQA = 1.12–1.23, clypeus height / AME = 1.75–2.50, cheliceral length / clypeus height = 6.50–7.71, sternum length / width = 1.17–1.35, palpal coxa length / width = 2.29–2.38, femur I length / carapace width = 0.97–1.05, metatarsus I length / carapace width = 0.71–0.85, femur IV length / carapace width = 0.95–1.05, cymbium length / carapace width = 0.41–0.44, palpal tarsus length / palpal patella length = 1.67–1.88, palpal tarsus length / palpal tibia length = 1.50–1.67, palpal tarsus length / palpal femur length = 0.81–1.00, palpal tibia length / palpal patella length = 1.10–1.13. Female genitalia vary as in Figs. 71 G, H, 81 B, E.

**Material examined.** MADAGASCAR: *Antananarivo Province*: Antananarivo, October 1988, W. Steiner (CASENT9006040, 1♂, USNM). *Antsiranana Province*: R.S. Manongarivo, 10.8 km 229°SW Antanambao, 13°57'42"S, 048°26'00"E, elev. 400m, sifted litter, rainforest, 8 November 1998, B. L. Fisher [BLF1996] (CASENT9006108, 1♀, CAS). *Mahajanga Province*: Parc National de Namoroka, 9.8 km 300°WNW Vilandro, 16°28'00"S, 045°21'00"E, elev. 140m, pitfall trap in

tropical dry forest, 4–8 November 2002, Fisher, Griswold *et al.* [BLF6444], (Holotype Male, CASENT9018660, 1♂, CAS), (Paratype Female, CASENT9082218, 1♀, CAS), (CASENT9065644, 2♂, 1♀, CAS), (CASENT9065645, 2♂, CAS), (CASENT9065646, 2♂, CAS), (CASENT9065647, 2♂, CAS), (CASENT9065648, 2♂, CAS); Analamanitra Forest, 14 km NE of Misinjo, 16°8'S, 45°42'E, elev. 20m, dense dry forest, malaise, 9–16 October 2007, M. Irwin and R. Harin'Hala [MG-38-04] (CASENT9042527, 1♂, CAS). Toamasina Province: 25 km W Morarano Chrome, (coordinates approximate) 17°45'S, 48°10'E, forest, yellow plate, 1–25 October 1991, A. Pauly (MRAC174.445, 1♂, MRAC).

**Natural history.** Collections are from dry forest and there is even one specimen labeled as coming from Antananarivo, although the habitat for this specimen, urban or not, is not specified. Specimens were taken on the forest floor in sifted litter and yellow pan traps and above the floor in a malaise trap. *Uduba rinha* are cribellate but we have no records of how they use cribellate silk.

**Distribution.** The species *Uduba rinha* is recorded on the west side of the great escarpment across the northern half of Madagascar on the high plateau and in western dry forests (Maps 3, 18).

### *Uduba salegy*, new species

Figures 7 E, 9 D, 11 A, 60 A–C, 74 A, B, Maps 2, 13.

**Type material.** Holotype male (CASENT9006044) from montane rainforest at 1000m elevation in Parc National Montagne d'Ambre, Antsiranana Province, Madagascar, collected 21–30 November 1993 by Jonathan Coddington, deposited in the USNM. Paratypes, two females (CASENT9006045), also from Parc National Montagne d'Ambre, Antsiranana Province, Madagascar, collected 12 August 1992 by Vince and Barbara Roth, deposited in CAS.

**Etymology.** The species epithet, *Salegy*, is a popular music genre from Madagascar that has its home in the north of Madagascar; a noun in apposition.

**Diagnosis.** *Uduba salegy* are members of Group I.a, the *Uduba dahl* group (Map 13) of Group I, the Epigynal atrium group. They are cribellate, with large, divided cribellum or vestige. Males can be distinguished from those of other *Uduba* with a screw-shaped TA3 by having the TA3 J-shaped and extending apicad of TA2, MA small, simple (Figs. 60 A–C). The females can be distinguished from those of other *Uduba* of the of Group I, the Epigynal atrium group, which have an epigynal plate with the median lobe surrounded by a depressed atrium, by having the median lobe end well anterior of epigastric furrow, with the posterior margin of atrium entire, forming a posterior pocket (Fig. 74 A).

**Description.** **Male** (Holotype): Total length 10.00. Markings as in Figs. 9 D, 11 A. Carapace 5.79 long, 4.07 wide, 1.79 high; clypeus 0.25 high. Eye diameters: AME 0.20, ALE and PME 0.21, PLE 0.23. Chelicerae 2.29 long; sternum 2.71 long, 2.04 wide; labium 1.07 long; palpal coxae 1.57 long. Divided cribellum. Spination: palpus–femur d0-0-1, p0-0-1, r0-0-1; leg I–femur d1-0-0-1, p0-0-2, r0-1-0-1, patella p1, tibia d0-0-1-1, p0-1-1-0, v2-2-2-2, r0-1-1-0, metatarsus p1-1-0, v2-2-3, r1-1-0; leg II–femur d0-1-0-1, p0-1-2, r0-1-0-1, patella p1, tibia d0-0-1-1, p0-1-1-0, v2-2-2-2, r0-1-1-0, metatarsus p1-1-2, v2-1-1, r1-1-1; leg III–femur d0-0-1-1, p0-1-1-1, r0-1-1-1, tibia d1-0-1-0, p0-1-1-0, v1-2-2, r0-1-1-0, metatarsus d0-1-0, p1-1-2, v2-2-2, r1-1-2; leg IV–femur d1-1-0-1, p0-0-0-1, r0-0-0-1, patella r1, tibia d0-1-1-0, p0-1-0-0, v2-2-2, r0-1-1-0, metatarsus p1-2-2, v2-2-2, r0-1-2. Scopulae: cymbium, apicodorsal; weak beneath tarsi and apices of all metatarsi. Leg measurements: I:  $5.00 + 2.14 + 5.07 + 5.14 + 2.93 = 20.09$ ; II:  $4.50 + 1.93 + 3.79 + 4.29 + 2.50 = 17.00$ ; III:  $3.71 + 1.79 + 2.00 + 3.07 + 1.93 = 12.50$ ; IV:  $5.00 + 1.93 + 4.00 + 5.07 + 2.36 = 18.36$ ; palpus:  $2.29 + 0.93 + 0.86 + \text{NA} + 2.50 = 6.57$ . Leg formula 1423. **Male palp** (Figs. 60 A–C): palpal tibia 0.38 times cymbial length, RTA straight, with pointed apex (Fig. 60 C), RTA length 0.47 tibia, length 1.78 times width, VTA slender, conical, elongate (Figs. 60 B, C), length 2.00 times

width, length 0.44 tibia width; tibia lacking stout spines; tegulum convex, without ridge, tegulum length 0.84 times width; TA1 extends distad of tegulum apex, TA1 extends past TA3 apex by 1.16 times tegulum length; TA3 J-shaped (Fig. 60 A), apicad of TA3 to TA2 by 1.125 tegulum length, TA2 a large triangular blade, behind TA3 apex; MA very small, simple (Figs. 60 A, C), origin at 0.44 tegulum length, length (including apical processes) 0.73 times width, length 0.19 tegulum length, width 0.22 tegulum width; conductor fan entire (Fig. 60 C). **Female** (Paratype, CASENT9006045): Total length 15.00. Markings as in male and as in Fig. 7 E. Carapace 7.57 long, 5.00 wide, 2.64 high; clypeus 0.43 high. Eye diameters: AME 0.21, ALE 0.25, PME 0.27, PLE 0.30. Chelicerae 3.50 long; sternum 3.39 long, 2.50 wide; labium 1.71 long; palpal coxae 2.57 long. Divided cribellum. Spination: palpus—femur d0-0-1, tibia p1-0, tarsus p2-0, v0-0-1; leg I—femur d1-0-1, p0-0-1, tibia v2-2-2-2, metatarsus p0-0-1, v1-2-2; leg II—femur d1-0-0, p0-0-1, tibia v1-1-2, metatarsus p0-0-1, v2-2-2; leg III—femur d0-1-0-1, p0-0-1-1, tibia d1-0-1-0, p0-1-1-0, v0-1-2, r0-1-1-0, metatarsus p1-2-2, v2-2-2, r1-1-2; leg IV—femur d1-0-0, tibia v1-1-2, r0-1-1-0, metatarsus p0-0-1-1, v1-2-2, r0-2-1. Scopulae: strong ventral beneath all tarsi and beneath metatarsi I and II and apices of metatarsi III and IV. Leg measurements: I:  $5.00 + 2.50 + 4.43 + 3.79 + 2.36 = 18.07$ ; II:  $4.50 + 2.29 + 3.21 + 3.00 + 2.14 = 15.14$ ; III:  $3.79 + 2.14 + 1.86 + 2.64 + 1.64 = 12.07$ ; IV:  $5.14 + 2.29 + 4.07 + 4.64 + 2.36 = 18.50$ ; palpus:  $2.29 + 1.29 + 1.36 + \text{NA} + 2.64 = 7.57$ . Leg formula 4123. **Female genitalia:** epigynal plate with median lobe surrounded by depressed atrium, plate width 1.18 times length (Fig. 74 A); atrium sides deeply concave, atrium wide, width 2.27 times atrium length, atrium with deep transverse concavity along posterior margin (Fig. 74 A); epigynum length 2.50 times atrium length, atrium width 0.77 times epigynum width; atrium width at side of ML 1.42 times ML width; atrium and ML end well anteriad of epigastric groove, atrium origin at 0.24 of epigynal plate length, median lobe narrow, slightly wider at base, median lobe length 2.08 times width, ML extends well anteriad of atrium apex, ML length extends 0.18 times epigynum length anteriad of atrium, ML length 0.45 times epigynal length; LL narrow, atrium width 7.15 times LL width; copulatory openings hidden beneath lateral margins of atrium, distance between CO 0.61 width of epigynal plate, CO distance from epigastric furrow 0.36 times epigynum length. Vulva (Fig. 74 B) with spermathecal ducts making four broad, transverse curves, vulva length 0.82 times width, fertilization ducts close-together, vulva width 11.25 times distance between fertilization ducts.

**Variation.** **Male** (N = 4): Total length = 10.00–12.57, carapace length / width = 1.37–1.48, carapace height / width = 0.44–0.55, PER / carapace width = 0.62–0.82, PER/OAL = 2.42–2.62, PER/AER = 1.32–1.38, OAL/OQL = 1.07–1.15, OQP/ OQA = 1.18–1.29, clypeus height / AME = 0.91–1.27, cheliceral length / clypeus height = 9.14–14.80, sternum length / width = 1.30–1.40, palpal coxa length / width = 1.93–2.45, femur I length / carapace width = 1.20–1.23, metatarsus I length / carapace width = 1.23–1.30, femur IV length / carapace width = 1.19–1.25, cymbium length / carapace width = 0.55–0.63, cymbium length / palpal patella length = 2.67–2.75, cymbium length / palpal tibia length = 2.92–3.07, cymbium length / palpal femur length = 1.06–1.21, palpal tibia length / palpal patella length 0.88–0.92. **Female** (N = 5): Total length = 11.00–17.14, carapace length / width = 1.43–1.53, carapace height / width = 0.47–0.62, PER / carapace width = 0.67–0.89, PER/OAL = 3.06–3.39, PER/AER = 1.33–1.45, OAL/OQL = 1.10–1.19, OQP/ OQA = 1.03–1.25, clypeus height / AME = 1.23–2.00, cheliceral length / clypeus height = 8.17–10.25, sternum length / width = 1.29–1.36, palpal coxa length / width = 1.79–2.40, femur I length / carapace width = 0.92–1.05, metatarsus I length / carapace width = 0.68–0.79, femur IV length / carapace width = 0.96–1.11, palpal tarsus length / carapace width = 0.41–0.53, palpal tarsus length / palpal tibia length = 1.50–2.06, palpal tarsus length / palpal femur length = 0.82–1.16, palpal tibia length / palpal patella length = 0.94–1.06. Epigynum

with median lobe length 1.80–3.33 times width; distance from atrium base to epigastric fold 0.19–0.26 times epigynum length.

**Material examined.** MADAGASCAR: *Antsiranana Province*: Parc National Montagne d'Ambre, 2.79 air km NE of park entrance, 12°32'S, 49°10'E, elev. approx. 1000m, 21–30 November 1993, C. Griswold, R. Andriamasimanana, N. Scharff, S. Larcher and J. Coddington (Holotype, CASENT9006044, 1♂, USNM), (CASENT9065490, 1♂, 2♀, CAS), (CASENT9006043, 1♂, CAS), (CASENT9006049, 1♀, USNM), pitfall traps, (CASENT9006047, 1♀, CAS); Parc National Montagne d'Ambre, 12°30'57"S, 49°11'4" E, 12 August 1992, V. and B. Roth [VR-MA-1992-01 (paratypes, CASENT9006045, 2♀, CAS), (CASENT9006048, 1♀, 1jj, CAS), [tracheal preparation of juvenile] (CASENT9006046, 2jj, CAS); Parc National Montagne d'Ambre, 3.6 km 235°SW Joffreville, 12°32'4"S, 49°10'46"E, elev. 925m, montane rainforest, general collecting day, 20–26 January 2001, J. J. Rafanomezantsoa *et al.*, [JJR0112] (CASENT9002793, 1♀, CAS), (CASENT9002792, 1♀, CAS), (CASENT9002791, 1♀, CAS); montane rainforest, ex ground level, 20–26 January 2001, Lisa J. Boutin, [LJB0001.2] (CASENT9003398, 1♀, CAS).

**Natural history.** This species, *Uduba salegy*, is only known from montane rainforest where individuals were collected in pitfall traps and under objects. We know nothing of its use of cribellate silk.

**Distribution.** *Uduba salegy* are known only from rainforests at Montagne d'Ambre in far northern Madagascar (Maps 2, 13).

### *Uduba sarotra*, new species

Figures 70 D, E, Maps 10, 21.

**Type material.** Holotype female (CASENT9030916) and two paratype females (CASENT9064719 and CASENT9064720) from montane rainforest at 1325m elevation in Parc National de Marojejy, Antsiranana Province, Madagascar, collected 18 November 2003 by B. L. Fisher, deposited in CAS.

**Etymology.** The species epithet is from a Malagasy word for difficult, *sarotra*; an adjective in apposition.

**Diagnosis.** *Uduba sarotra* are an Unclassified species (Map 21) and females can be distinguished from those of other *Uduba* that have a divided cribellum by the form of the epigynum (Fig. 70 D): the epigynal plate lacks sclerotized lateral margin, not projecting laterally, ML short, limited to anterior half of epigynal plate, CO hidden beneath ML, spermathecae path, if visible through epigynal cuticle, seen only posteriad of copulatory openings. Males are unknown.

**Description.** **Male** Unknown. **Female** (Holotype, CASENT9030916): Total length 10.50. Markings typical of *Uduba*. Carapace 3.80 long, 2.80 wide, 1.40 high; clypeus 0.20 high. Eye diameters: AME 0.13, ALE 0.20, PME 0.18, PLE 0.22. Chelicerae 2.00 long; sternum 1.90 long, 1.55 wide; labium 0.80 long; palpal coxae 1.45 long. Divided cribellum. Spination: palpus–femur d0-1-1, patella p1-0, tibia p2-0, tarsus p2-1-0, v0-0-1; leg I–femur d0-1-0, p0-0-1, tibia v2-2-2-2, metatarsus v2-2-3; leg II–femur d0-1-0, tibia r0-1-0, metatarsus v2-2-3; leg III–femur d1-0-0, tibia d0-1-0, p0-1-1-0, v0-1-1-0, r0-1-1-0, metatarsus p1-2-2, v2-1-2, r1-1-2; leg IV–femur d1-0-0, tibia v1-1-2, r0-0-1, metatarsus p0-0-2, v0-2-2-2, r0-0-2. Scopulae: strong ventral on tarsi I–IV, metatarsus I, apex of metatarsi II and IV. Leg measurements: I:  $2.80 + 1.40 + 2.40 + 2.20 + 1.60 = 10.40$ ; II:  $2.50 + 1.20 + 1.90 + 1.80 + 1.30 = 8.70$ ; III:  $2.00 + 1.10 + 1.10 + 1.50 + 1.10 = 6.80$ ; IV:  $2.80 + 1.30 + 2.40 + 2.60 + 1.40 = 10.50$ ; palpus:  $1.40 + 0.70 + 0.70 + \text{NA} + 1.30 = 4.10$ . Leg formula 4123. **Female genitalia:** epigynal plate without depressed atrium, posterior margin at epigastric furrow convex (Fig. 70 D), plate width 1.37 times length, ML and LL not clearly defined, CO beneath longitudinal grooves in anterior half of plate, distance between CO 0.41 times epigynum

width, CO origin at 0.44 of epigynum length, extant of plate laterad to CO equals 0.19 times plate width. Vulva (Fig. 70 E) with spermathecal ducts forming two-and-a-half longitudinal loops, vulva length 0.67 times width, FD widely spaced, vulva width 3.86 times distance between FD.

**Variation.** Female (N= 3): Total length = 7.30–11.10. Carapace length / width = 1.36–1.50, carapace height / width = 0.50–0.73, PER / carapace width = 0.46–0.48, PER/OAL = 3.00–3.10, PER/AER = 1.17–1.40, OAL/OQL = 1.00–1.18, OQP/ OQA = 1.23–1.39, clypeus height / AME = 1.54–1.67, cheliceral length / clypeus height = 9.00–10.00, sternum length / width = 1.23–1.35, palpal coxa length / width = 2.00–2.17, femur I length / carapace width = 0.92–1.00, metatarsus I length / carapace width = 0.79–0.88, femur IV length / carapace width = 1.00–1.09, palpal tarsus length / carapace width = 0.46–0.53, palpal tibia length / palpal patella length = 1.70–2.17, palpal tarsus length / palpal tibia length = 1.86–2.17, palpal tarsus length / palpal femur length = 0.93–1.00, palpal tibia length / palpal patella length = 0.90–1.00. Male variation unknown; *U. sarotra* are known only from females.

**Material examined.** MADAGASCAR: *Antsiranana Province*: Parc National de Marojejy, Antranohofa, 26.6 km 31°NNE Andapa, 10.7 km 318° NW Manantenina, 14°26'36"S, 049°44'36"E, elev. 1325m, general collecting day spiders in montane rainforest, 18 November 2003, B. L. Fisher, [BLF9082] (*Uduba sarotra* Holotype, CASENT9030916, 1♀, CAS), (paratype, CASENT9064719, 1♀, CAS), (paratype CASENT9064720, 1♀, CAS).

**Natural history.** Collection records suggest that the cribellate *Uduba sarotra* occur only in montane rainforest.

**Distribution.** The species *Uduba sarotra* is known only from the type locality at Parc National de Marojejy in Antsiranana Province in northeastern Madagascar (Maps 10, 21).

### *Uduba schlingeri*, new species

Figures. 2 A, C, 3 A–H, 7 G, 9 A, 11 G, 12 A–D, 13 A–F, 14 A–H, 20 G, 21 A–D, 22 A–D, 23 A–D, 24 A–F, 25 B, D, E, 26 A, B, 29 E, 61 A–C, 62 A–E, 73 D, E, 80 A, B, 83 A–E, 84 A–C, Maps 5, 14.

**Type material.** Holotype male (CASENT9006052) from rainforest at Talatakely, Parc National Ranomafana, Fianarantsoa Province, Madagascar, collected 5–18 April 1998 by C. E. Griswold, deposited in CAS. Paratype male, same data, also CASENT9006052, deposited in CAS; paratype male (CASENT9006053) from forest at research cabin at Talatakely, P. N. Ranomafana, collected 28 April 1998 by C. E. Griswold, deposited in CAS. Paratype female (CASENT9006079) from Parc National Ranomafana, collected 23 March 1992, V. and B. Roth, deposited in MCZ.

**Etymology.** The species epithet is a patronym in honor of Evert I. Schlinger, entomological explorer, charismatic teacher, and generous mentor. The eponymous Schlinger Foundation provided extensive support for Arachnology at the California Academy of Sciences and also for the Malaise Trap survey of Madagascar arthropods, i.e., the Schlinger *et al.*, Malaise Trap Survey, which endeavor produced many of the spiders examined by our revision.

**Diagnosis.** *Uduba schlingeri* are members of Group I.c, the *Uduba funerea* group (Map 15) of Group I, the Epigynal atrium group. They are cribellate with cribellum divided (Fig. 20 G) or with vestige of a divided cribellum (Fig. 21 A). Males have the palp (Figs. 61 A–C) with TA2 highly sclerotized, black, TA2 forming a chela around TA3 apex (Figs. 29 E, 62 C, E), TA3 transverse, tapering to a sharp point (Figs. 62 D, E). Females have an epigynal plate with a median lobe surrounded by a depressed atrium (Figs. 80 A, 84 A); median lobe extends to epigastric furrow (Fig. 73 D). *Uduba schlingeri* are distinguished from the ecribellate *U. andriamihajai* in having a divided cribellum (Figs. 20 G, 23 A).

**Description. Male** (Holotype): Total length 14.29. Markings as in Figs. 3 C, E, F, H, 9 A, 11 G. Carapace 9.07 long, 6.43 wide, 2.86 high; clypeus 0.43 high. Eye diameters: AME 0.39, ALE



and PME 0.41, PLE 0.45. Chelicerae 4.07 long; sternum 4.11 long, 3.11 wide; labium 1.96 long; palpal coxae 2.86 long. Divided cribellum (Fig. 21 A). Spination (Mt Papango CASENT9062276): palpus—femur d0-0-1-1, p0-0-0-1, r0-0-0-1; leg I—femur d1-1-0-1, p0-1-1-1, r1-1-1-1, patella p1, r1, tibia d0-1-1-0, p0-1-1-0, v2-2-2-2, r0-1-1-0, metatarsus p0-1-1-0, v2-2-3, r0-1-1-0; leg II—femur d1-1-0-1, p0-1-1-1, r1-1-1-1, tibia d0-1-1-0, p0-1-1-0, v2-2-2-2, r0-1-1-0, metatarsus p0-1-1-0, v2-2-3, r0-1-1-0; leg III—femur d1-0-1-1, p0-1-1-1, r0-1-1-1, patella r1, tibia d0-1-1-0, p0-0-0-1, v1-2-2, r0-0-1-0, metatarsus p1-1-2, v2-2-2, r1-1-2; leg IV—femur d1-1-0-1, p0-1-1-1, r0-0-0-1, patella r1, tibia-tarsus of CASENT9062276 lost; (leg IV of holotype): femur d1-1-0-1, p0-1-1-1, r0-1-1-1, patella r1, tibia d0-0-1-0, p0-1-0-1, v2-2-2, r0-1-0-1, metatarsus p0-1-1-2, v1-2-2-2, r1-2-2). Scopulae: cymbium, apicodorsal (Figs. 62 A, C); beneath tarsi and apices of all metatarsi. Leg measurements (holotype): I:  $8.93 + 3.64 + 9.21 + 10.00 + 5.14 = 36.93$ ; II:  $8.43 + 3.36 + 7.64 + 8.64 + 4.50 = 32.57$ ; III:  $6.79 + 3.21 + 4.86 + 7.36 + 3.50 = 25.71$ ; IV:  $9.14 + 3.14 + 8.36 + 11.07 + 4.64 = 36.36$ ; palpus:  $4.14 + 1.43 + 1.64 + \text{NA} + 4.07 = 11.29$ . Leg formula 1423. **Male palp** (Figs. 29 E, 61 A–C, 62 A–E) (CASENT9006062): palpal tibia 0.42 times cymbial length, RTA broadly triangular, with pointed apex (Fig. 61 C), RTA length 0.22 tibia length, length 0.89 width, VTA cylindrical, straight, with rounded apex (Figs. 61 B, C, 62 B, C), VTA length 3.00 times width, length 0.39 times tibia width, tibia lacking stout spines; tegulum convex, without ridge, tegulum length 0.975 times width; TA1 extends distad of tegulum apex, TA1 extends past TA3 apex by 1.57 times tegulum length; TA3 transverse, tapering to a sharp point (Figs. 61 A, B), concave dorsally (Figs. 62 D, E), TA3 apex visible in front of TA2; TA2 highly sclerotized, black, concave medially against TA3, in this species forming a chela around TA3 apex (Figs. 29 E, 62 E); MA transverse, concave in middle with proximal and distal enlargements (Figs. 61 A, 62 D), origin at 0.35 times tegulum length, tegulum apex at 0.425 tegulum length from MA apex, length (including apical processes) 0.61 times width, MA length 0.275 tegulum length, MA width 0.44 times tegulum width; conductor fan entire (Figs. 61 A–C, 62 A–E). **Female** (Paratype, CASENT9006079): Total length 17.14. Markings as in Figs. 3 A, B, D, 7 G. Carapace 8.71 long, 6.00 wide, 3.71 high; clypeus 0.64 high. Eye diameters: AME, PME and PLE 0.36, ALE 0.38. Chelicerae 4.14 long; sternum 3.93 long, 3.04 wide; labium 1.96 long; palpal coxae 3.04 long. Cribellum divided (Figs. 20 G, 26 A, B). Spination (Talatakely, CASENT9006056): palpus—femur d0-0-2; leg I—femur d1-0-1-0, p0-0-2, tibia v2-2-2-2, metatarsus v2-2-3; leg II—femur d1-0-1-0, p0-0-1-1, tibia v1-1-2, metatarsus v2-2-3; leg III—femur d1-0-0-0, p0-0-0-2, r0-1-0-1, tibia d0-1-0, p0-1-1-0, v1-2-2, r0-1-1-0, metatarsus p1-2-2, v2-2-2, r1-1-2; leg IV—femur d0-1-1-0, r0-0-0-1, tibia v1-1-2, r0-1-1-0, metatarsus p0-0-1-1, v2-2-2, r0-0-1-1. Scopulae: strong ventral beneath all tarsi and metatarsi and apices of tibiae I and II (Figs. 13 A, C, 14 A–E, G). Leg measurements (Paratype, CASENT9006079): I:  $6.93 + 3.21 + 6.07 + 5.00 + 3.14 = 24.36$ ; II:  $6.43 + 3.14 + 4.79 + 4.29 + 2.86 = 21.50$ ; III:  $5.00 + 2.50 + 2.64 + 3.79 + 1.86 = 15.79$ ; IV:  $6.64 + 2.86 + 5.43 + 6.14 + 2.71 = 23.79$ ; palpus:  $3.43 + 1.71 + 1.86 + \text{NA} + 2.79 = 9.79$ . Leg formula 1423. **Female genitalia** (Talatakely, CASENT9006057): epigynal plate with median lobe surrounded by depressed atrium (Figs. 73 D, 84 A), plate width 1.31 times length; atrium sides concave, atrium width 1.81 times atrium length; epigynum length 1.95 times atrium length, epigynum width 1.42 times atrium width; atrium width at side of ML 0.86 times ML width, 1.71 times LL width; atrium origin near epigastric groove, atrium origin at 0.12 of epigynal plate length, median lobe extends posteriad to epigastric groove, median lobe length 2.07 times width, ML extends anteriorly of atrium apex by 0.15 times epigynum length, ML length 0.71 times epigynal length; lateral lobes narrow, atrium width at side of ML 1.71 times LL width; CO hidden beneath posterolateral margins of atrium, distance between CO 0.70 times width of epigynal plate, CO distance from epigastric furrow 0.29 times epigynum length. Vulva (Figs. 73 E, 84 B) with spermathecal ducts making two transverse

curves, vulva length 1.04 times width, FD close-together, vulva width 8.17 times distance between FD.

**Variation.** **Male** (N = 9): Total length = 14.70–24.29, carapace length / width = 1.41–1.78, carapace height / width = 0.42–0.71, PER / carapace width = 0.44–0.92, PER / OAL = 2.43–3.21, PER / AER = 1.21–1.42, OAL / OQL = 1.00–1.09, OQP / OQA = 1.02–1.16, clypeus height / AME = 1.33–2.00, cheliceral length / clypeus height = 6.44–10.83, sternum length / width = 1.24–1.43, palpal coxa length / width = 1.53–3.10, femur I length / carapace width = 1.27–1.59, metatarsus I length / carapace width = 1.29–1.60, femur IV length / carapace width = 1.30–1.56, cymbium length / carapace width = 0.62–0.72, cymbium length / palpal patella length = 2.85–3.08, cymbium length / palpal tibia length = 2.48–2.80, cymbium length / palpal femur length = 0.98–1.24, palpal tibia length / palpal patella length = 1.04–1.15. Markings as in Figs. 3 C, E, F, H, 9 A, 11 G, 12 A–C. Palpus as in Figs. 29E, 61 A–C, 62 A–E. **Female** (N = 7): Total length = 14.00–27.14, carapace length / width = 1.41–1.69, carapace height / width = 0.42–0.71, PER / carapace width = 0.44–0.92, PER / OAL = 2.43–3.21, PER / AER = 1.21–1.42, OAL / OQL = 1.00–1.09, OQP / OQA = 1.02–1.16, clypeus height / AME = 1.33–2.00, cheliceral length / clypeus height = 6.44–10.83, sternum length / width = 1.24–1.48, palpal coxa length / width = 1.82–2.18, femur I length / carapace width = 1.00–1.25, metatarsus I length / carapace width = 0.73–0.85, femur IV length / carapace width = 0.97–1.16, palpal tarsus length / carapace width = 0.37–0.48, palpal tarsus length / palpal patella length = 1.58–1.82, palpal tarsus length / palpal tibia length = 1.48–1.54, palpal tarsus length / palpal femur length = 0.76–0.89, palpal tibia length / palpal patella length = 1.04–1.15. Markings vary as in Figs. 3 A, B, D, G, 7 G, 12 D, F. Epigynum varies as in Figs. 73 D, 80 A, 84 A; vulva varies as in Figs. 73 E, 80 B, 83 B–E, 84 B.

**Material examined.** MADAGASCAR: *Antsiranana Province*: Parc National Montagne d'Ambre, 12°31'13"S, 49°10'45"E, elev. 1125m, malaise trap, 4–19 March 2001, M. Irwin, R. Harin'Hala [MA-01-01D-05] (CASENT9001832, 1♂, CAS). *Fianarantsoa Province*: 9 km NE Ivohibe, 6.5 km ESE Angodongodona, 22°25.6'S, 046°56.3'E, Camp #5, elev. 900m, undisturbed rainforest, pitfall traps #13–15, 12–17 September 1997, S. Goodman (CASENT9006080, 1♂, FMNH) (CASENT9006070, 1♂, FMNH); Parc National de Midousy, NE slope Mt. Papango, along Andrauorena River, 2 km SW Befotaka, 23°50.1'S, 46°57.8'E, elev. 875m, pitfall, 26–31 October 2003, L. E. Olsen, (CASENT9064783, 1♂, FMNH), (CASENT9062276, 1♂, FMNH), (CASENT9062277, 1♂, FMNH), (CASENT9062778, 1♂, FMNH); Parc National Ranomafana, Vatoharanana, ca. 21°12'S, 47°27'E, 9–10 May 1992, V. and B. Roth, and S. Kariko (CASENT9025468, 1♀, MCZ), (CASENT9006075, 1♀, CAS); Vatoharanana (coordinates approximate) 21°16'S, 47°28'E, general collecting, ["Ten-I, KARIKO-ROTH VOUCHER COLLECTION"], 5 May 1992, V. and B. Roth and S. Kariko (CASENT9006078, 1♀, MCZ); Vatoharanana, 4.0 km SW Ranomafana (ville), 21°14.7'S, 047°26.0'E, elev. 1025m, pitfalls, slightly transitional lowland to lower montane rainforest, 3–9 October 2000, coll. S. Goodman [FMNH#00-225] (CASENT9064665, 1♂, FMNH), Vatoharanana River, 4.1 km 231°SW Ranomafana, 21°17'24"S, 047°26'00"E, elev. 1100m, montane rainforest, general collecting at night, 27–31 March 2003, Fisher-Griswold Arthropod Team [BLF8395] (CASENT9017832, 1♂, CAS), [BLF8394] (CASENT9017835, 1♂, CAS); Parc National Ranomafana, Vohiparara, piste touristique, 21°13.6'S, 47°24.0'E, elev. ca. 1000m, 26–27 April 1998, C. Griswold, D. Kavanaugh, N. Penny, D. Ubick, M. Raherilalao, J., Schweikert and S. Ranorainarisoa [*Dong Lin nest photos, this publication, Figures 2 A, C*] (CASENT9006058, 1♀, CAS); Talatakely, Research cabin, 21°14.9'S, 47°25.6'E, 9–30 April 1998, C. Griswold, D. Kavanaugh, N. Penny, D. Ubick, M. Raherilalao, J., Schweikert and S. Ranorainarisoa (Paratype, CASENT9006053, 1♂, CAS); Talatakely, 21°14.9'S, 47°25.6'E, 9–30 April 1998, C. E. Griswold, D. H. Kavanaugh, N. D. Penny, M. J. Raherilalao, J.

S. Ranorianarisoa, J. Schweikert and D. Ubick (CASENT9006054, 1♂, CAS), (CASENT9006055, 1♂, CAS), (CASENT9006057, 1♀, CAS), CASENT9006051, 3♂, CAS); Talatakely, 21°14.9'S, 47°25.6'E, "trail F, burrow at tree base" 5–18 April 1998, C. E. Griswold, D. H. Kavanaugh, N. D. Penny, M. J. Raheirilalao, J. S. Ranorianarisoa, J. Schweikert and D. Ubick (CASENT9006056, 1♀, CAS), Talatakely, 21°14.9'S, 47°25.6'E, 5–18 April 1998, Ranomafana N. P., township of Ranomafana, 31 May 1992, V. Roth, (CASENT9006062, 1♂, CAS); Ranomafana N.P., at camp (coordinates approximate) 21°16'S, 47°28'E, general collecting, 23 March 1992, V. and B. Roth (Paratype, CASENT9006079, 1♀, 3jj, CAS); 7 km W Ranomafana, elev. 1100m, 22–31 October 1988, W. Steiner (CASENT9006061, 2♂, USNM). *Toliara Province*: Forêt Analavelona, Antanimena, 12.5 km NW Andranoheza, 22°40.7'S, 44°11.5'E, elev. 1050m, transitional mid-altitude forest with elements of eastern and western forests, pitfall traps, 9–15 March 1998, S. Goodman (CASENT9065671, 1♂, FMNH); Réserve Naturelle Intégrale d'Andohahela, 13.5 km NW Eminiminy, parcel #1, camp #3, 24°35.0'S, 46°44.1'E, elev. 1200m, 7–17 November 1995, S. Goodman [FMNH#12] (CASENT9006082, 1♀, FMNH), [FMNH#71-7-2-S] (CASENT9006081, 1♀, FMNH); Réserve Naturelle Intégrale d'Andohahela, 8 km NW Eminiminy, parcel #1, camp #1, 24°37.6'S, 46°45.9'E, elev. 440m, 19–28 October 1995, S. Goodman, (CASENT9006063, 2♂, FMNH), (CASENT9006060, 1♂, FMNH), (CASENT9006059, 1♂, FMNH).

**Natural history.** Many records from pitfall traps reveal that males of *Uduba schlingeri* wander, even up into vegetation where they have been collected in malaise taps. Females of this cribellate species are recorded as burrowing, e.g., at Talatakely where a record states "trail F, burrow at tree base." They make a vertical tube of silk that may extend above the soil surface, and which may be surmounted by a funnel of cribellate silk (Figs. 2 A, C).

**Distribution.** The species *Uduba schlingeri* has been collected in rainforests from Montagne d'Ambre from far northern Madagascar south through the eastern mountains to Andohahela (Maps 5, 14). A southwestern collection record of *U. schlingeri* from Forêt Analavelona pitfall traps at elevation 1050m, in "transitional mid-altitude forest with elements of eastern and western forests", represents a spider collected in a disjunct outlier of typical eastern rainforest vegetation.

### *Uduba tarality*, new species

Figures 63 A–C, Maps 10, 14.

**Type material.** Holotype male (CASENT9042524) from malaise at 822m elevation in the Miandritsara Forest, 40Km S of Ambositra, Fianarantsoa Province, Madagascar, collected 25 October–4 November 2006 by R. Harin'Hala and M. Irwin, deposited in CAS. Paratypes, two males, one from Sahamalaza National Park, Antsiranana Province (CASENT9064667) deposited in CAS, and one from Forest des Milua, Toliara Province (FMNH-INS#-0000-044-065) deposited in FMNH.

**Etymology.** The species epithet is from the Malagasy word *tarality*, which is an annual rice harvest festival held on the island of Madagascar; a noun in apposition.

**Diagnosis.** *Uduba tarality* are members of Group I.c, the *Uduba funerea* group (Map 15) of Group I, the Epigynal atrium group. Males can be distinguished from those of other cribellate (with at least vestige of a divided cribellum) *Uduba* by having the male palp (Figs. 63 A–C) with TA2 highly sclerotized, black, concave medially against TA3, MA forked, concave in middle with proximal and distal small pointed projections (Fig. 63 B). The forked MA distinguishes *Uduba tarality* from other divided cribellum males: *U. tarality* are distinguished from those of *U. woodae* and *U. lehibekokoa* by having the MA with proximal and distal small pointed projections (Fig. 63 B), tegulum apex at 0.40 tegulum length from MA apex, length (including apical processes) 0.69 times

width: *U. lehibekokoa* (Figs. 50 A–C) and *U. woodae* (Figs. 66 A–C) have the MA with only a proximal sharp point, and the MA smaller and farther distad, with the tegulum apex less than 0.35 tegulum length from MA apex, MA length (including apical processes) less than 0.50 times width. The female of *Uduba taralily* is unknown.

**Description. Male** (Holotype). Total length 10.80. Markings typical of *Uduba*. Carapace 6.70 long, 4.60 wide, 2.00 high; clypeus 0.30 high. Eye diameters: AME 0.20, ALE 0.22, PME 0.24, PLE 0.30. Chelicerae 2.90 long; sternum 3.00 long, 2.20 wide; labium 1.30 long; palpal coxae 2.10 long. Divided cribellum. Spination. palpus–femur d1-1-3; leg I–femur d1-1-0-1, p0-0-0-2, r0-1-0-1, patella p1, r1, tibia p1-0-0-0, v2-2-0-1, r1-0-0-0, metatarsus p0-0-1-2, v2-2-2, r0-1-0-1; leg II–femur d1-1-1, p0-1-0-2, r0-1-1-1, patella p1, r1, tibia d0-0-1-1, p0-1-1-0, v2-2-2-2, r0-1-1-0, metatarsus p0-1-0, v2-2-2, r0-1-0; leg III–femur d1-1-1, p0-1-0-2, r0-1-0-2, patella p1, r1, tibia d0-1-0, p0-1-1-0, v2-1-2, r0-1-1-0, metatarsus p1-2-0-2, v2-2-0-2, r1-1-0-2; leg IV–femur d1-1-1, p0-1-1-1, r0-0-0-1, patella p1, r1, tibia d0-0-1-0, p0-1-1-0, v2-2-2, r0-1-1-0, metatarsus p1-1-1-2, v1-1-1-1-1-2, r1-1-0-2. Scopulae: cymbium, apicodorsal; tarsi I–IV, ventral. Leg measurements: I:  $5.80 + 2.50 + 4.50 + 4.90 + 3.10 = 20.80$ ; II:  $5.50 + 2.30 + 4.50 + 5.00 + 3.20 = 20.50$ ; III:  $4.70 + 2.10 + 3.30 + 4.10 + 2.60 = 16.80$ ; IV:  $6.30 + 2.10 + 5.40 + 7.00 + 3.30 = 24.10$ ; palpus:  $2.30 + 0.70 + 1.10 + \text{NA} + 3.10 = 7.20$ . Leg formula 4123. **Male palp:** palpal tibia 0.395 times cymbial length, RTA broadly triangular, with pointed apex sharply-curved ventrally (Fig. 63 C), RTA length 0.315 times tibia length, length equals width, VTA length 1.33 times width, length 0.43 times tibia width, VTA conical, straight, with rounded apex (Figs. 63 A, B); tibia lacking stout spines; tegulum convex, without ridge, tegulum length 0.94 times width; TA1 extends distad of tegulum apex, TA1 extends past TA3 apex by 1.30 times tegulum length; TA3 transverse, tapering to a blunt apex, concave dorsally, TA3 apex reflexed (Figs. 63 B, C), visible in front of TA2; TA2 highly sclerotized, black, concave medially against TA3 apex and even with TA3 apex (Figs. 63 A, B); MA transverse, concave in middle with proximal and distal small pointed projections (Fig. 63 B), origin at 0.44 times tegulum length, tegulum apex at 0.40 tegulum length from MA apex, length (including apical processes) 0.69 times width, MA small, length 0.20 tegulum length, width 0.27 times tegulum width; conductor fan entire (Fig. 63 C). **Female:** Unknown.

**Variation.** (N = 3): Total length 10.89–14.30, carapace length / width = 1.41–1.46, carapace height / width = 0.43–0.50, PER / carapace width = 0.36–0.37, PER / OAL = 2.73–2.87, PER / AER = 1.25–1.38, OAL / OQL = 1.07–1.12, OQP / OQA = 1.03–1.17, clypeus height / AME diameter width = 1.50–1.67, cheliceral length / clypeus height = 8.25–9.67, sternum length / width = 1.36–1.38, palpal coxa length / width = 2.63–2.67, femur I length / carapace width = 1.26–1.33, metatarsus I length / carapace width = 1.07–1.39, femur IV length / carapace width = 1.35–1.37, cymbium length / carapace width = 0.55–0.67, cymbium length / palpal patella length = 3.60–4.43, cymbium length / palpal tibia length = 2.82–3.27, cymbium length / palpal femur length = 1.29–1.35, palpal tibia length / palpal patella length = 1.10–1.57.

**Material examined.** MADAGASCAR: *Antsiranana Province:* Sahamalaza National Park, 52 km W Maropapango, MG69-Region Sofia, District Analalava, Ankarafa subhumid evergreen forest, 14°09'49"S, 47°42'10"E, elev. 192m, 12–19 October 2016, R. Harin'Hala and M. Irwin (paratype, CASENT9064667, 1♂, CAS). *Fianarantsoa Province:* Miandritsara Forest, 40Km S of Ambositra, 20°47.56'S, 47°10.54'E, elev. 822m, malaise in low altitude rainforest, 25 October–4 November 2006, R. Harin'Hala and M. Irwin [MG-29-66] (Holotype, CASENT9042524, 1♂, CAS). *Toliara Province:* Forest des Milua, 8.4 km SSE of Befandefa, 22°13.00'S, 43°19.80'E, elev. 50m, pitfalls #10–12, 8–10 March 2003, V. Sourivalal (paratype, FMNH-INS#-0000-044-065, 1♂, FMNH).

**Natural history.** Males of *Uduba taralily* have been collected in various forest habitats from

only 50m elevation by pitfalls up to a collection by malaise trap at over 800m elevation. Collection of individuals in pitfalls and malaise traps suggest that males wander on the ground and up into the vegetation. Males have a vestige of a divided cribellum, but we know nothing of the use of cribellate silk by this species.

**Distribution.** The three widely separated records of this species (Maps 10, 14) suggest that *Uduba taralily* occurs throughout dry forests west of the mountain spine of Madagascar.

***Uduba valiha*, new species**

Figures 6 C, 8 F, 28 B, 64 A–C, 65 A–F, 72 G, H, 80 H, I, Maps 10, 17.

**Type material.** Holotype male (CASENT9026394) and one paratype male (CASENT9082181) collected in rainforest at 600m elevation in Forêt de Vèvembe, Fianarantsoa Province, Madagascar, on 23 April 2006 by B.L. Fisher *et al.*, deposited in CAS. Paratype female (CASENT9006071) collected at 785m elevation from Massif Andringitra, Fianarantsoa Province, Madagascar on 24 September 1993 by B.L. Fisher, deposited in CAS.

**Remarks.** The form of the male palp is similar among *Uduba valiha*, *U. fisheri* and *U. hiragasy*: females of *U. fisheri* and *U. hiragasy* have been collected with and therefore associated with males but no females have been collected with *U. valiha*. The form of the female genitalia of both the species *U. fisheri* and *U. hiragasy* is similar to that of specimen CASENT9006071 from Massif Andringitra, suggesting this female belongs to the same group of species. Because this female is distinct from those of *U. fisheri* and *U. hiragasy*, and geographically near the male localities of *U. valiha*, we tentatively associate the males collected in rainforest at 600m elevation in Forêt de Vèvembe with the female collected at 785m elevation from Massif Andringitra as *U. valiha*. There appears to be an error on the label for specimens collected by S. Goodman at Forêt de Vinetalo [FMHD-00-223, i.e., CASENT9064656, 3♂, FMNH]: the label states “[212°*sic*] 46.6'S, 47°20.8'E” but according to maps and Google Earth the locality should be 21°46.6'S, 47°20.8'E.

**Etymology.** The species epithet, *valiha*, refers to a tube zither considered the “national instrument” of Madagascar, a noun in apposition.

**Diagnosis.** *Uduba valiha* belong to Group III, the *Uduba valiha* group (Map 17). They are cribellate with divided cribellum or vestige. Males differ from other species by having a retromedian ridge on the tegulum (Figs. 64 C, 65 E), and a deeply bifid MA (Fig. 28 B) with prolateral lobe slender, retrolateral lobe stout; *U. valiha* males differ from those of *U. hiragasy* by having a short, stout retrolateral spine on the palpal tibia (Fig. 64 C) (spine absent in *U. hiragasy*, Fig. 44 C), by having the TA2 apically rolled (Fig. 28 B) (blunt, entire in *U. hiragasy*, Fig. 28 A) and the apex of the MA prolateral lobe rounded slender (Figs. 64 A, 65 E) (truncate in *U. hiragasy*, Fig. 44 B). Females lack a median lobe or defined atrium on the epigynum (Figs. 72 G, 80 H) and have the vulva with spermathecal loops few, anteroposteriorly oriented (Figs. 72 H, 80 I); *U. valiha* can be distinguished from those of similar *Uduba* species by having the lateral epigynal margins strongly convex (Fig. 72 G, 80 H) (but the lateral margins not developed into the lateral “ears” found in *U. evanescens* and *U. pseudoevanescens*, Figs. 71 A, E); distinguished from female *U. fisheri* (Fig. 72 E), and *U. hiragasy* (Fig. 72 C) by lacking a strong ridge along epigastric furrow and having lateral lobes with convex edges forming ridges or lobes on each side, these ridges extending around anteriorly and posteriorly of CO (Fig. 72 G).

**Description. Male** (holotype): Total length 9.00. Markings as in Fig. 8 F. Carapace 4.60 long, 3.10 wide, 1.60 high; clypeus 0.25 high. Eye diameters: AME 0.18, ALE, PME and PLE 0.20. Chelicerae 1.80 long; sternum 2.10 long, 1.60 wide; labium 1.00 long; palpal coxae 1.50 long. Divided cribellum. Spination (paratype CASENT9082181): palpus–femur d1-1-1, p0-0-1, tibia r0-1-0, p0-1-0; leg I–femur d1-1-1, p0-1-1-0, r0-1-1-1, patella p1, tibia d0-1-1-1, p0-1-1-0, v2-2-2-2, r0-



1-1-0, metatarsus p1-1-2, v2-2-2, r1-1-1; leg II—femur d1-1-1, p0-1-1-0, r0-1-1-1, patella p1, tibia d0-0-1-1, p0-1-1-0, v2-2-2-2, r0-1-1-0, metatarsus p1-1-2, v2-2-2, r1-1-1; leg III—femur d1-1-1, p1-0-1-1, r1-0-1-1, patella p1, tibia d1-0-1-0, p0-1-1-0, v2-2-2, r0-1-1-0, metatarsus d0-1-0, p1-1-2, v2-2-1, r1-1-2; leg IV—femur d1-1-1, p0-1-1-1, r0-0-1-0, tibia d1-0-1-0, p0-1-1-0, v2-2-2, r0-1-1-0, metatarsus p1-2-2, v2-2-2, r1-1-2. Scopulae: cymbium, apicodorsal (Fig. 65 A); tarsi I–IV, ventral. Leg measurements (holotype): I:  $4.20 + 1.60 + 4.00 + 4.30 + 2.50 = 16.60$ ; II:  $3.90 + 1.50 + 3.40 + 3.60 + 2.20 = 14.60$ ; III:  $3.30 + 1.40 + 2.40 + 3.30 + 1.90 = 12.30$ ; IV:  $4.60 + 1.40 + 4.00 + 5.20 + 2.30 = 17.50$ ; palpus:  $1.80 + 0.70 + 0.80 + \text{NA} + 2.00 = 5.30$ . Leg formula 4123. **Male palp** (holotype): palpal tibia 0.41 cymbial length, RTA triangular, procurved, with pointed apex (Figs. 64 C, 65 A, C), RTA length 0.33 tibia, VTA triangular, short, length 0.30 tibia width (Figs. 64 B, C), UTA small; tibia with slender prolateral and a stout retrolateral spine (Fig. 64 C); tegulum (Figs. 64 C, 65 D) with longitudinal, retromedian ridge, ridge beginning near tegulum base and extending for 0.80 tegulum length; TA3 a pointed spine, mostly hidden behind TA2, TA2 small, rectangular, apex curled (Fig. 28 B); MA origin at 0.56 tegulum length, extends to tegulum apex, length (including apical processes) slightly greater than width, length 0.45 tegulum width, deeply bifid MA with prolateral lobe slender, with rounded apex, retrolateral lobe stout with apical hook (Figs. 64 A–C); tegulum with apical mound that partially covers prolateral lobe of MA (Fig. 64 A); conductor fan entire. **Female** (paratype): Total length 10.00. Markings as in Fig. 6 C. Carapace 4.79 long, 3.29 wide, 2.14 high; clypeus 0.21 high. Eye diameters: AME 0.18, ALE and PME 0.25, PLE 0.21. Chelicerae 2.43 long; sternum 2.18 long, 1.61 wide; labium 1.07 long; palpal coxae 1.61 long. **Ratios**—carapace length / width = 1.46, carapace height / width = 0.65, PER / carapace width = 0.67, PER/OAL = 2.67, PER/AER = 1.31, OAL/OQL = 1.00, OQP/ OQA = 1.24, clypeus height / AME = 1.20, cheliceral length / clypeus height = 11.33, sternum length / width = 1.36, palpal coxa length / width = 2.25, femur I length / carapace width = 1.00, metatarsus I length / carapace width = 0.76, femur IV length / carapace width = 1.00, palpal tarsus length / carapace width = 0.37, palpal tibia length / palpal patella length = 1.42, palpal tarsus length / palpal tibia length = 1.42, palpal tarsus length / palpal femur length = 0.81, palpal tibia length / palpal patella length = 1.00. Divided cribellum. Spination: palpus—femur d0-0-1-1, r0-0-1, tibia p2-1, r1-0, tarsus p2-1; leg I—femur d0-1-1-0, p0-0-2, tibia v2-2-2-2, metatarsus v2-2-3; leg II—femur d0-1-1-0, p0-0-0-1, tibia v1-1-1-2, metatarsus v2-2-3; leg III—femur d0-1-0-0, p0-1-0-1, r0-1-0-1, tibia d1-1-0-0, p0-1-1-0, v2-1-2, r0-1-1-0, metatarsus p1-1-2, v2-2-2, r1-1-2, tarsus v0-1-0; leg IV—femur d0-1-1-0, tibia v1-2-2, r0-1-1-0, metatarsus p0-1-2, v0-2-2, r1-1-2, tarsus v0-1-0. Scopulae: ventral on metatarsus—tarsus I and II, ventral on apical metatarsus—tarsus III and IV. Leg measurements: I:  $3.29 + 1.57 + 2.43 + 2.50 + 1.50 = 11.29$ ; II:  $2.79 + 1.43 + 2.07 + 1.86 + 1.36 = 9.50$ ; III:  $2.43 + 1.07 + 1.43 + 1.79 + 1.07 = 7.79$ ; IV:  $3.29 + 1.50 + 2.57 + 3.21 + 1.43 = 12.00$ ; palpus:  $1.50 + 0.86 + 0.86 + \text{NA} + 1.21 = 4.43$ . Leg formula 4123. **Female genitalia**: epigynal plate without depressed atrium (Figs. 72 G, 80 H), plate width 1.43 times length, lateral lobes with convex edges forming ridges on each side, these convex, these ridges extending around anteriorly and posteriorly of CO, width between bases of LL 0.88 times epigynum width, LL side width 0.14 times width epigynum; median lobe a flat plate, copulatory openings at mid-level of plate at 0.41 of epigynum length, distance between copulatory openings 0.58 times epigynum width. Vulva (Figs. 72 H, 80 I) with spermathecal ducts forming 2–3 loose, longitudinal loops, vulva length 0.88 times width, fertilization ducts very close, vulva width 16.50 times distance between FD.

**Variation.** Male (N= 5): Total length 8.50–11.00; carapace length / width = 1.38–1.68, carapace height / width = 0.49–0.55, PER / carapace width = 0.34–0.38, PER/OAL = 2.19–2.60, PER/AER = 1.24–1.51, OAL/OQL = 1.13–1.37, OQP/ OQA = 1.19–1.39, clypeus height / AME = 1.11–1.67, cheliceral length / clypeus height = 7.00–10.50, sternum length / width = 1.29–1.41,

palpal coxa length / width = 2.33–2.80, femur I length / carapace width = 1.16–1.35, metatarsus I length / carapace width = 1.11–1.39, femur IV length / carapace width = 1.18–1.48, cymbium length / carapace width = 0.60–0.70, cymbium length / palpal patella length = 2.86–3.83, cymbium length / palpal tibia length = 2.33–2.80, cymbium length / palpal femur length = 1.05–1.28, palpal tibia length / palpal patella length = 1.14–1.50. Compared to specimens from Vinetelo, specimens from Vevembe have the legs slightly relatively longer and the cymbium slightly shorter. Female variation unknown: only one female, a paratype, has been collected.

**Material examined.** MADAGASCAR: *Fianarantsoa Province*: Forêt de Vevembe, 66.6 km 293°WNW Farafangana, 22°47'28"S, 047°10'55"E, elev. 600m, yellow pan trap, rainforest in transition to montane forest, 23 April 2006, B.L. Fisher *et al.* [BLF14119] (Holotype, CASENT9026394, 1♂, CAS), (paratype, CASENT9082181, 1♂, CAS), Forêt de Vinetalo, at foot of Ambodivohita, 21°46.6'S, 47°20.8'E, elev. 100m, disturbed lowland rainforest in transition to montane forest, pitfall traps, S. Goodman [FMHD-00-223] (CASENT9064656, 3♂, FMNH), Massif Andringitra, 45 km S Ambalavo, 22°13'S, 47°1'E, elev. 785m, rainforest, pitfall trap, 24 September 1993, B.L. Fisher (paratype CASENT9006071, 1♀, CAS).

**Natural history.** All specimens of *Uduba valiha* have been collected in rainforest at low to mid elevation, from 100m to 785m, and all were collected in pitfall or yellow pan traps, suggesting that males and females of this cribellate species both wander at some point in their lives. We know nothing of the use of cribellate silk in *U. valiha*.

**Distribution.** The species *Uduba valiha* is known only from three forested localities in southeastern Madagascar (Maps 10, 17).

### *Uduba volana*, new species

Figures 7 C, 77 D–F, Maps 5, 16.

**Type material.** Holotype female (CASENT9006072) dug from a burrow at 1400m elevation from Ambohimanga, Antananarivo Province, Madagascar, collected 2 November 1993 by C. Griswold, deposited in CAS.

**Etymology.** The species epithet is from the Malagasy *volana volana*, meaning a crescent moon; a noun in apposition.

**Diagnosis.** *Uduba volana* are members of Group II, the Epigynum lateral projection group, or *Uduba evanescens* group (Map 16). They have a divided cribellum. Females can be distinguished from those of other *Uduba* by having the epigynal plate wide (width 1.52 times length) and with the lateral ears very slender, LL side width 1.25 times LL side length (Figs. 77 D, E). Males are unknown.

**Description.** **Male:** Unknown. **Female** (holotype): Total length 13.71. Markings as in Fig. 7 C. Carapace 5.79 long, 3.71 wide, 2.57 high; clypeus 0.29 high. Eye diameters: AME 0.21, ALE, PME and PLE 0.27. Chelicerae 2.79 long; sternum 2.71 long, 2.00 wide; labium 1.21 long; palpal coxae 1.96 long. **Ratios**—carapace length / width = 1.56, carapace height / width = 0.69, PER / carapace width = 0.67, PER/OAL = 2.77, PER/AER = 1.33, OAL/OQL = 1.00, OQP / OQA = 1.17, clypeus height / AME = 1.33, cheliceral length / clypeus height = 9.75, sternum length / width = 1.36, palpal coxa length / width = 1.83, femur I length / carapace width = 1.08, metatarsus I length / carapace width = 0.73, femur IV length / carapace width = 1.06, palpal tarsus length / carapace width = 0.38, palpal tibia length / palpal patella length = 1.33, palpal tarsus length / palpal tibia length = 1.33, palpal tarsus length / palpal femur length = 0.69, palpal tibia length / palpal patella length = 1.00. Divided cribellum. Spination: palpus—femur d0-0-2, patella p1-0, tibia p2-0, tarsus p2-1; leg I—femur d1-0-0, p0-0-2, tibia v2-2-2, metatarsus v2-2-3; leg II—femur d1-0-0, p0-0-1, tibia p0-1-1-0, v1-1-2, metatarsus v2-2-3; leg III—femur d1-1-0-0, p1-0-1-1, tibia d1-0-0, p0-1-1-0,

v1-0-2, r0-1-1-0, metatarsus p1-2-2, v2-2-2, r1-1-2, tarsus v1-0; leg IV—femur d1-0-0, tibia v0-1-2, r1-0-1, metatarsus p1-2-2, v2-1-2-2, r1-2-2. Scopulae: strong ventral beneath tarsi I–IV, beneath metatarsi I and II and beneath apices of metatarsi III and IV. Leg measurements: I:  $4.00 + 1.86 + 2.93 + 2.71 + 1.64 = 13.14$ ; II:  $3.36 + 1.79 + 2.36 + 2.29 + 1.57 = 11.36$ ; III:  $2.71 + 1.43 + 1.29 + 1.86 + 1.14 = 8.43$ ; IV:  $3.93 + 1.79 + 2.93 + 2.93 + 1.71 = 13.29$ ; palpus:  $2.07 + 1.07 + 1.07 + \text{NA} + 1.43 = 5.64$ . Leg formula 4123. **Female genitalia:** epigynal plate without depressed atrium, lateral lobes extending to sides forming slender, earlike lobes (Figs. 77 D, E), plate width 1.52 times length; width between bases of LL 0.33 times epigynum width; lateral ears (LL side) width 0.17 times width epigynum, lateral ears (LL side) very slender, width 1.25 times LL side length, arising far from epigastric furrow; median lobe a flat plate, each side with a bulge beneath the transverse hood formed by the posterior margin of the LL, width 0.33 times epigynum width, 0.66 times ML length, with copulatory openings beneath near ML bulge beneath LL hood at 0.51 epigynum length from epigastric furrow, distance between copulatory openings 0.60 times epigynum width. Vulva (Fig. 77 F) with spermathecal ducts forming 2–3 loose, transverse loops, vulva length 0.68 times width, fertilization ducts widely separated, vulva width 5.91 times distance between FD.

**Variation.** Unknown: only the holotype female is known.

**Material examined.** MADAGASCAR: *Antananarivo Province*: Ambohimanga, 18°44'S, 47°34'E, elev. 1400m, "from short burrows in road cut, night collecting," 2 November 1993, C. Griswold, S. Larcher, N. Scharff [CEG009] (holotype, CASENT9006072, 1♀, CAS).

**Natural history.** The cribellate female of *Uduba volana* was collected from a short burrow on an incline in disturbed secondary forest in the central highlands.

**Distribution.** The species *Uduba volana* is known only from the type locality in Antananarivo Province, in central Madagascar (Maps 5, 16.).

### *Uduba woodae*, new species

Figures 7 J, K, 9 B, 66 A–C, 67 A–F, 78 A–F, 79 A, B, 80 D, Maps 8, 14.

**Type material.** Holotype male (CASENT9017834) from general collecting and pitfall traps in spiny forest at 20m elevation at Lake Ranobe, Toliara Province, Madagascar, collected 13–21 May 2003 by the Frontier Wilderness Project [MGF072], deposited in CAS. Paratype female (CASENT9064773), same data, also in CAS.

**Etymology.** The species epithet is patronym in honor of Dr. Hannah Wood, collector of many *Uduba* and many other rare and cryptic arachnid specimens from around the world, student of the evolution, functional morphology and behavior of the assassin spiders (Palpimanoidea) and with a focus on the pelican spiders (Archaeidae), ancient survivors from tropical Gondwanaland.

**Remarks.** Our concept of *Uduba woodae* is a cribellate species found in the drier southwestern parts of Madagascar. An epigynum that has a clearly defined median lobe and surrounding atrium is associated with a male palpus that has a screw shaped TA3, e.g., as in *Uduba dahli*, *U. platnicki*, and *U. schlingeri*. Females of *Uduba woodae* have a divided cribellum and a median lobe plus atrium type epigynum that has the part of the epigynal plate that is posteriad of the atrium high, nearly equal in length to the ML itself (Figs. 78 A, C, E, 79 B). Females from southwestern Madagascar (Toliara Province) that have divided cribella and this type of epigynum include CASENT9000536 from Forêt de Beroboka (Fig. 78 A) and CASENT9030930 from Mikea Forest, NW of Manombo, which are here considered to be examples of *U. woodae*. An old series of female specimens collected by Carougeau during 19–30 November 1901 and deposited in the Paris Museum (MNHN) also shows these epigynal characters. The collection locality for these specimens may

be Ambovombe, which is in far southern Madagascar, also in Toliara Province. All these unique collections of cribellate females are considered to belong to species *U. woodae*.

**Diagnosis.** *Uduba woodae* are members of Group I.b, the *Uduba woodae* group (Map 14) of Group I, the Epigynal atrium group. They are cribellate, with divided cribellum or vestige. Males have the palp (Figs 66 A–C, 67 A–F) with TA2 highly sclerotized, black, concave medially against TA3 (Fig. 66 B), MA concave in middle with proximal sharp point (Figs. 66 C, 67 D), origin at 0.45 times tegulum length. Males are distinguished from *U. lehibekokoa* by having a sharp point on the MA, the TA3 apex blunt (Figs. 66 C, 67 B), the VTA that is short and straight (Figs. 66 A, C), length less than 2 times width, and specimens that are smaller in size, total length = 9.00–12.40mm (*U. lehibekokoa* males have the MA smooth, the TA3 apex pointed, VTA long and curved apically, length greater than 2 times width, Figs. 50 A–C, and specimens that are larger in size, total length 14.00–15.50mm). Females have the epigynal plate with median lobe surrounded by depressed atrium (Figs. 78 A, C, E, 79 B), ML elongate, length at least 1.5 times width, atrium narrow and ML broad. The median lobe ends well anterior of epigastric furrow, the post-atrial plate of the epigynum is very high and the epigynum length is greater than 1.5 times atrial length (Figs. 78 A, C, E, 79 B, 80 D).

**Description. Male** (Holotype): Total length 9.80. Markings as in Fig. 9 B. Carapace 6.10 long, 4.20 wide, 2.10 high; clypeus 0.30 high. Eye diameters: AME, ALE and PLE 0.22, PME 0.20. Chelicerae 2.40 long; sternum 2.70 long, 2.10 wide; labium 1.30 long; palpal coxae 1.90 long. Divided cribellum. Spination: palpus–femur d1-1-3, tibia p0-1-0; leg I–femur d1-1-1-1, p0-1-0-2, r0-1-1-0, patella p1, r1, tibia d0-1-1-0, p1-0-1-0, v2-2-2-2, r1-0-1-0, metatarsus p1-2-2, v2-2-1-2, r1-1-1; leg II–femur d1-0-1-1, p0-1-1-1, r1-1-1-1, patella p1, r1, tibia d0-0-0-1, p0-1-1-0, v2-2-2-2, r0-1-1-0, metatarsus p1-1-1, v2-2-1-2, r1-1-1; leg III–femur d1-1-1, p0-1-1-1, r0-1-1-1, patella p1, r1, tibia d0-0-1-0, p0-1-1-0, v2-2-2, r0-1-1-0, metatarsus d0-1-0-0, p1-1-2, v2-2-2, r1-1-2; leg IV–femur d2-01-1, p0-1-1-0, r0-1-1-0, patella p1, r1, tibia d0-0-1-0, p0-1-1-0, v2-1-2-2, r0-1-1-0, metatarsus d0-1-0-0, p1-1-1-2, v1-1-1-2-2, r1-1-2. Scopulae: cymbium, apicodorsal (Fig. 67 A); strong beneath all tarsi. Leg measurements: I:  $5.90 + 2.30 + 5.70 + 5.60 + 3.50 = 23.00$ ; II:  $5.00 + 2.10 + 4.40 + 4.90 + 3.00 = 19.40$ ; III:  $4.40 + 1.70 + 3.00 + 4.40 + 2.50 = 16.00$ ; IV:  $6.00 + 2.10 + 5.30 + 7.10 + 3.10 = 23.60$ ; palpus:  $2.10 + 0.80 + 0.90 + \text{NA} + 2.50 = 6.30$ . Leg formula 4123. **Male palp:** palpal tibia 0.36 times cymbial length, RTA very broad, crescentic, with pointed apex (Figs. 66 A, 67 A), RTA length 0.26 tibia length, length 0.75 times width, VTA conical, distally hooked, with rounded apex (Figs. 66 A, C, 67 B, C), length 1.67 times width, VTA length 0.29 times tibia width; tibia with slender prolateral spine (Figs. 66 A, 67 C); tegulum convex, without ridge (Figs. 66 B, C, 67 D), tegulum length 0.92 times width; TA1 rounded, blunt apically, extends distad of tegulum apex, TA1 extends past TA3 apex by 1.27 times tegulum length; TA3 transverse, tapering, concave dorsally, rounded TA3 apex reflexed, visible in front of TA2 (Fig. 66 B); TA2 highly sclerotized, black, concave medially against TA3 (Figs. 66 A, B, 67 B, E); MA transverse, simple, concave in middle with proximal sharp point (Figs. 67 D, E), origin at 0.45 times tegulum length, tegulum apex at 0.32 tegulum length from MA apex, MA length (including apical processes) 0.41 times width, MA small, length 0.16 tegulum length, width 0.35 times tegulum width; conductor fan entire (Fig. 66 C). **Female** (paratype): Total length 11.40. Markings as in Figs. 7 J, K. Carapace 5.50 long, 3.80 wide, 2.70 high; clypeus 0.30 high. Eye diameters: AME and PME 0.18, ALE and PLE 0.22. Chelicerae 2.80 long; sternum 2.40 long, 1.90 wide; labium 2.20 long; palpal coxae 2.80 long. Divided cribellum. Spination: palpus–femur d0-0-2, p1, tibia p0-1-0, tarsus p2-1-1; leg I–femur d0-1-0-1, p0-0-0-1, tibia v1-1-1-2, metatarsus p0-0-1, v2-2-3; leg II–femur d0-1-0-0, p0-0-0-1, tibia v1-1-1-2, metatarsus v2-2-3; leg III–femur d0-1-0-1, p0-1-0-1, r0-1-0-1, tibia p0-1-1-0, v1-1-2, r0-1-1-0, metatarsus p1-1-1, v2-2-2, r1-1-2; leg IV–femur d1-0-0-

I, tibia v1-1-2, r0-1-1-0, metatarsus p0-0-2-2, v2-2-2, r0-2-2. Scopulae: strong ventral beneath all tarsi and apices of metatarsi II–IV. Leg measurements: I:  $3.10 + 1.90 + 2.90 + 2.40 + 1.70 = 12.00$ ; II:  $3.10 + 1.70 + 2.30 + 2.10 + 1.60 = 10.80$ ; III:  $2.70 + 1.40 + 1.50 + 2.20 + 1.40 = 9.20$ ; IV:  $3.70 + 1.60 + 2.80 + 3.60 + 1.70 = 13.40$ ; palpus:  $1.90 + 0.90 + 1.00 + \text{NA} + 1.70 = 5.50$ . Leg formula 4123. **Female genitalia:** epigynal plate with median lobe surrounded by depressed atrium (Fig. 78 E), plate width 1.24 times length; atrium width 1.83 times atrium length, atrium sides evenly convex; epigynum length 2.50 times atrium length, atrium width 0.53 times epigynum width; atrium width at side of ML 0.47 times ML width; atrium and ML arise well anterior of epigastric groove, atrium origin at 0.26 of epigynal plate length, ML relatively large, bell-shaped, ML length 0.62 times epigynal length, ML length 1.82 times width, ML extends far anterior of atrium apex; LL broad, atrium width 2.06 times LL width; CO hidden beneath posterolateral margin of atrium, distance between CO 0.50 times width of epigynal plate, CO distance from epigastric furrow 0.34 times epigynum length. Vulva (Fig. 78 F), with spermathecal ducts making three, transverse curves, vulva length 0.60 times width, FD close-together, vulva width 7.57 times distance between FD.

**Variation. Male** ( $N = 5$ ): Total length = 9.00–12.40, carapace length / width = 1.34–1.57, carapace height / width = 0.47–0.52, PER / carapace width = 0.36–0.38, PER / OAL = 2.94–4.76, PER / AER = 1.28–1.38, OAL / OQL = 1.06–1.16, OQP / OQA = 1.07–1.20, clypeus height / AME = 1.25–1.59, cheliceral length / clypeus height = 8.00–11.50, sternum length / width = 1.24–1.38, palpal coxa length / width = 2.22–3.20, femur I length / carapace width = 1.16–1.40, metatarsus I length / carapace width = 1.16–1.47, femur IV length / carapace width = 1.22–1.45, cymbium length / carapace width = 0.61–0.70, cymbium length / palpal patella length = 3.10–3.75, cymbium length / palpal tibia length = 2.58–3.29, cymbium length / palpal femur length = 1.11–1.44, palpal tibia length / palpal patella length = 1.00–1.38. Palpus as in Figs. 66 A–C, 67 A–F. **Female** ( $N = 7$ ): Total length = 11.00–22.43, carapace length / width = 1.23–1.49, carapace height / width = 0.44–0.72, PER / carapace width = 0.42–0.70, PER / OAL = 2.79–4.00, PER / AER = 1.25–1.59, OAL / OQL = 1.00–1.17, OQP / OQA = 1.04–1.23, clypeus height / AME diameter width = 1.56–2.08, cheliceral length / clypeus height = 7.00–10.00, sternum length / width = 1.18–1.27, palpal coxa length / width = 1.94–3.11, femur I length / carapace width = 0.82–1.06, metatarsus I length / carapace width = 0.63–0.72, femur IV length / carapace width = 0.95–1.04, palpal tarsus length / carapace width = 0.39–0.45, palpal tibia length / palpal patella length = 1.52–2.00, palpal tarsus length / palpal tibia length = 1.35–2.18, palpal tarsus length / palpal femur length = 0.71–0.96, palpal tibia length / palpal patella length = 0.92–1.13. Genitalia with epigynal plate (Figs. 78 A, C, E, 79 B) width 0.94–1.24 times length; atrium width 1.57–1.83 times atrium length, atrium sides nearly straight to evenly convex; epigynum length 1.69–2.56 times atrium length, atrium width at side of ML 0.21–0.85 times ML width; ML length 0.51–0.62 times epigynal length, median lobe length 1.57–3.00 times width, ML length extends 0.34–0.85 times epigynum length anterior of atrium. Vulva (Figs. 78 B, D, F, 79 A, 80 D) with spermathecal ducts making two to three transverse curves, vulva length 0.57–0.625 times width, FD widely-spaced to close-together, vulva width 3.30–7.57 times distance between FD.

**Material examined.** MADAGASCAR: *Fianarantsoa Province*: Italaviana, 35 km SSE of Antsirabe, 20°10.40'S, 47°05.16'E, elev. 1360m, malaise trap in *Uapaca* forest, 24 April–8 May 2005, M. Irwin and R. Harin'Hala [MA-24-71] (CASENT9042522, 1♂, CAS). *Border of Fianarantsoa Province and Tulear Province*: 9 km SW of Ilikaka Saphir [sic., Sapphire] town, 22°37.73'S, 45°21.67'E, elev. 1036m, malaise in *Uapaca* forest, 6 March 2002, M. Irwin and R. Harin'Hala [MG-12-11] (CASENT9032853, 1♂, CAS), 27 February–6 March 2002 [MG-12-10] (CASENT9032855, 1♂, CAS). *Mahajanga Province*: Western slope of Anjanaharibe-Sud, 13.5 km



SW Befingotra, 14°47.0'S, 49°26.5'E, elev. 1600m, undisturbed transitional montane rainforest, Camp #1, pitfall 7, 26 October–1 November 1999, S. Goodman (CASENT9064657, 1♂, FMNH). *Toliara Province*: Lake Ranobe, 23°02.524'S, 43°37.214'E, elev. 20m, general collecting and pitfall traps in spiny forest, 13–21 May 2003, Frontier Wilderness Project [MGF072] (holotype ♂, CASENT9017834, paratype ♀, CASENT9064773, CAS), [MGF067] (CASENT9017831, 1♂, CAS); Mikea Forest, NW of Manombo, 22°54.22'S, 43°28.53'E, elev. 30m, malaise trap in deciduous dry forest, 13–21 October 2002, M. Irwin, R. Harin'Hala [MA-02-18A-36] (CASENT9030930, 1♀, CAS); Forêt de Beroboka, 5.9 km 131°SE Ankidranoka, 22°13'59"S, 43°21'59"E, elev. 80m, tropical dry forest, pitfall trap, 12–16 March 2002, Fisher-Griswold Arthropod Team [BLF6068] (CASENT9000536, 1♀, CAS); Andohahela National Park, Tsimelasy, Parcelle #II, 24°56.21'S, 46°37.60'E, elev. 180m, malaise trap in transitional forest, 3–15 May 2003, M. Irwin, F. Parker, and R. Harin'Hala [MA-02-20-24] (CASENT9021818, 1♂, CAS); Forest des Milua, 19 km SW Tanadava, 21°52.00'S, 43°39.60'E, elev. 50m, pitfalls, 16–25 March 2003, V. Sourivalalam (FMHD#2003-10, 1♂, FMNH); Beza Mahafaly Reserve, Parcelle #I near research station, 23°41.19'S, 44°35.46'E, elev. 165m, malaise trap in dry deciduous forest, 28 November–4 December 2001, M. E. Irwin, F. D. Parker and R. Harin'Hala [MA-02-14A-04] (CASENT9042545, 1♂, CAS). *MADAGASCAR: no locality*: probably Ambovombe, 19–30 November 1901, Carougeau, (7 ♀, MNHN), listed as follows: (CASENT9006098, 1♀, MNHN), (CASENT9006092, 1♀, MNHN), (CASENT9006093, 1♀, MNHN), (CASENT9006094, 1♀, MNHN), (CASENT9006095, 1♀, MNHN), (CASENT9006096, 1♀, MNHN), (CASENT9006097, 1♀, MNHN).

**Natural history.** The species *Uduba woodae* appears to occur mostly in dry parts of Madagascar (Maps 8, 14), and is recorded from dry deciduous forest, tropical dry forest, transitional dry forest in Andohahela, *Uapaca* forest and even spiny forest. Collection of individuals in malaise traps in addition to terrestrial pitfall traps suggests that wandering males may climb into vegetation in their search for females; females may also wander, as one was collected in a terrestrial pitfall trap. *Uduba woodae* spiders are cribellate, with a divided cribellum or vestige, but we know nothing of the use of silk by this species.

**Distribution.** *Uduba woodae* specimens have been collected in Southern Madagascar in the drier portions of Fianarantsoa and Tulear Provinces with an outlier in the northeast (Maps 8, 14).

## DISCUSSION – CONCLUSIONS

### Current knowledge

Our study of *Uduba* of Madagascar is based on 573 mature specimens. We are describing 35 new species out of a total of 39. Both sexes are recognized for 17 of 39 species: *Uduba dahli* Simon, 1903, *Uduba evanescens* (Dahl, 1901) and *Uduba madagascariensis* (Vinson, 1863), and the new species *Uduba balsama*, *U. fisheri*, *U. halabe*, *U. hiragasy*, *U. ibonia*, *U. irwini*, *U. kavanaughi*, *U. platnicki*, *U. pseudoevanescens*, *U. rinha*, *U. salegy*, *U. schlingeri*, *U. valiha* and *U. woodae*. Ten new species are known only from males: *Uduba andriamihajai*, *U. fandroana*, *U. hainteny*, *U. lakroa*, *U. lamba*, *U. lehibekokoa*, *U. rajery*, *U. rakotofrah*, *U. rakotozafy* and *U. taralily*. Twelve species are known only from females including *Uduba funerea* Simon 1906 and the new species, *Uduba barbarae*, *U. danielae*, *U. goodmani*, *U. heliani*, *U. ida*, *U. jayjay*, *U. lavitra*, *U. milamina*, *U. orona*, *U. sarotra* and *U. volana*. Finding the unknown opposite sex or associating currently unmatched species is a priority for future research.

**How well do we know *Uduba* species?** We recognize 20 narrowly distributed species and 19

widely distributed species. Fifteen species are known from a single collection, nine of these from a single specimen (*Uduba funerea* Simon 1906 and eight new species: *Uduba hainteny*, *U. heliani*, *U. ida*, *U. jayjay*, *U. orona*, *U. rajery*, *U. rakotozafy* and *U. volana*). An additional six species are known from a single collecting event, revealing few to many individuals (*Uduba dahli* Simon, 1903 and the new species *U. hiragasy*, *U. lakroa*, *U. lehibekokoa*, *U. rakotofrah* and *U. sarotra*). We can't know if these rarely collected species are truly rare or if their apparent restricted distributions are an artifact of inadequate collecting, although we believe that the massive and widespread efforts in the last 15 years by the Fisher-Griswold Arthropod Team and the Schlinger *et al.* Malaise Trap Survey must have provided a realistic picture of spider diversity. An additional five new species have proven locally common within a narrow area: *Uduba danielae*, *U. ibonia*, *U. kavanaughi*, *U. lavitra* and *U. salegy*. These species seem to be common at least in one place and at one time: perhaps this reflects true narrow endemism. Finally, 19 species are known from several collections and may represent truly widespread species: *Uduba evanescens* (Dahl, 1901) and *U. madagascariensis* (Vinson, 1863) and 17 new species: *Uduba andriamihajai*, *U. balsama*, *U. barbara*, *U. fandroana*, *U. fisheri*, *U. goodmani*, *U. halabe*, *U. irwini*, *U. lamba*, *U. milamina*, *U. platnicki*, *U. pseudoevanescens*, *U. rinha*, *U. schlingeri*, *U. taralily*, *U. valiha* and *U. woodae*.

### Classification of *Uduba* species

We have not attempted a quantitative analysis of morphological data. Unfortunately, our attempts to obtain DNA data were inconsistent, and frequently failed. Whereas some specimens were collected into 95% ethanol, and even some field-dissected and had legs placed in RNALater®, many specimens were not DNA-ready. One of the most productive means of collecting *Uduba* was in pitfall traps with a combination water-5% formalin preservative. These specimens did not preserve DNA usable for our techniques. Treatment of specimens after collecting may also have degraded DNA. Most *Uduba* specimens were collected as part of more inclusive surveys of all Madagascar arthropods, which may have used mass-collecting techniques, e.g., pitfall traps, yellow-pan traps and malaise trapping. Specimens were then carried for days or weeks without refrigeration, for example, in a backpack or a truck, and often endured high ambient temperatures, i.e., 30–40 degrees C. Attempts to extract useable DNA from our specimens were mostly made during the 2000's. Perhaps newer methods would be more successful but a DNA phylogeny of *Uduba* is beyond the scope of this monograph.

Comparison to other Udubidae, and to representatives of the OC-Clade (Oval Calamistrum Clade; Griswold et al. 2005: 75; Griswold and Ramirez 2017: 27, fig. 2.1) more broadly, reveals that within *Uduba* there are many peculiar genitalic morphologies, which we suggest may be putative synapomorphies. Species may be grouped based on genitalic similarities, which suggests that cribellate/ecribellate species pairs may actually be sister species. We propose the following species groups, which are based on putative genitalic synapomorphies. Several males and females cannot be placed in any of our groups.

### *Uduba* species groups

We have separated species into groups based on unique genitalic morphologies. The groups comprise: **Group I**, the *Epigynal atrium group* including 20 species and subdivided into three subgroups: **Group I.a**, the *Uduba dahli group* (nine species, Map 13), **Group I.b**, the *Uduba woodae group* (six species, Map 14) and **Group I.c**, the *Uduba funerea group* (five species, Map 15); **Group II**, the *Epigynum lateral projection group*, or *Uduba evanescens group* (six species,

Map 16), **Group III**, the *Uduba valiha* group (three species, Map 17), **Group IV**, the *Uduba rinha* group (two species, Map 18), **Group V**, the *Uduba rajery* group (two species, Map 19), **Group VI**, the *Uduba danielae* group (two species, Map 20) and finally, four species that are relegated to *Unclassified species* (Map 21). Whereas we do not present a phylogenetic analysis, we note that these unique genitalic morphologies are not found in other Udubidae, nor have we observed identical morphologies in other members of the OC-Clade. We consider the characters listed below as putative synapomorphies for these groups. It remains for a future phylogenetic analysis to corroborate or refute these hypotheses.

**I. Epigynal atrium group.** This is a group of 20 species (Maps 13–15) in which the female epigynum has a clearly defined median lobe surrounded by depressed atrium (Figs. 73 B, D, 74 A, C, D, 80 A, 84 A). The copulatory openings are hidden; in most species they are hidden beneath the margins of the atrium, but at least in *Uduba halabe* the copulatory openings are hidden beneath the sides of the median lobe. The vulval ducts make two or more spirals. Males of particular genitalic morphologies are associated with females of the *Epigynal atrium* group, so we feel safe in assigning some species to this group even if those species are known only from males. Among species of the *Epigynal atrium* group are two subgroups defined by unique male genitalic conformations, plus five species known only from females.

**I. a. *Uduba dahli* subgroup.** This group of nine species (Map 13) in the *Epigynal atrium* group in which males have the TA3 forming a large screw (Figs. 29 D, F, 43 A–C, 47 A–C): the TA2 may be of various forms. Included are the ecribellate *Uduba lamba*, *U. fandroana*, *U. hainteny*, *U. kavanaughi*, and *U. platnicki*. The species *U. halabe* has an entire cribellum (Fig. 20 A), and *U. salegy*, *U. dahli* Simon 1903 and *U. ibonia* have a divided cribellum (Fig. 20 B).

**I. b. *Uduba woodae* subgroup.** This group of six species (Map 14) in the *Epigynal atrium* group have males in which the TA2 of the palp is strongly sclerotized, often black, and is adjacent to or embracing the TA3 (Figs. 29 E, 61 A–C, 66 A–C). Included are two ecribellate species *U. andriamihajai* and *U. balsama*, and four species with a divided cribellum: *U. schlingeri*, *U. taralily*, *U. lehibekokoa* and *U. woodae* (Fig. 20G).

**I. c. *Uduba funerea* subgroup.** This group of five species (Map 15) in the *Epigynal atrium* group are as yet recognized only from female specimens. Included are *Uduba funerea* Simon, 1906, which has an entire cribellum and the four ecribellate species *U. barbarae*, *U. lavitra*, *U. orona* and *U. milamina*. We cannot assert the monophyly of this group.

**II. Epigynum lateral projection group (*Uduba evanescens* group).** This is a group of six species (Map 16) in which females have the lateral lobes of the epigynum projecting (Figs. 77 A, C, E), even so far as to form ear-like projections (Figs. 71 A, E); associated males have palpal TA2 extending to a point beyond TA1 and TA3 and MA with prolateral notches resembling a “can opener” (Figs. 29 A, B, 35 B, 54 B, 57 B). We also refer to this as the *Uduba evanescens* group, after the first member species to be described in 1901. Cribellate species have a divided cribellum and include *Uduba pseudoevanescens* and *U. rakotofrah* (known only from the male, which has the typical TA2 and MA morphology, Fig. 57 B) and *U. volana* (known only from the female, which has slender epigynal lateral lobes, Fig. 77 E). Probably the cribellate *U. heliani* (Fig. 72 A) and the ecribellate *U. goodmani* (Fig. 77 A), which are known from the female only, belong to *Uduba evanescens* group, as both have weakly developed lateral processes on the epigynum. The new species *Uduba pseudoevanescens* has a divided cribellum (Fig. 20 C) and is known from both sexes: it is amazingly similar to the ecribellate (Fig. 20 D) species *U. evanescens* (Dahl, 1901), which is also known from male and female.

**III. *Uduba valiha* group.** Three species (Map 17), all with a divided cribellum, have the male with a branched MA (Fig. 29 H) and a strong spine on the palpal tibia (Figs. 40 B, 44 A, 64 B, C),

and female with the spermathecal ducts visible through the epigynal cuticle arching far anterior of the epigynal plate (Figs. 72 C, E, G). Details of the TA2, tibial spination, and epigynal shape distinguish the three included species: *U. hiragasy*, *U. fisheri* and *U. valiha*. One species, *Uduba valiha* (Fig. 72 G), has a female that conforms to the *Epigynum lateral projection group* suggesting a possible relationship between the *Uduba valiha* and *Epigynum lateral projection groups*.

**IV. *Uduba rinha* group.** This is a group of two closely related species (Map 18) that have a divided cribellum and that are characterized by a trapezoidal MA in the male (Figs. 29 I, 46 B, 59 B) and female epigyna with copulatory openings located beneath an anterior, divided hood and spermathecal ducts visible through the epigynal cuticle to form a circular loop cuticle that extends far posterior of the epigynal plate (Figs. 71 C, G). Included are the new species *Uduba rinha* and *U. irwini*.

**V. *Uduba rajery* group.** This is another small group comprising only two new species (Map 19), in this case only known from unique males, which appear to have a divided cribellum. The genitalia are strikingly distinct: the palpal tibia has thick, swollen VTA (Figs. 55 A–C, 58 A–C), and the bulb has the TA2 extending through a regular notch and a large, triangular MA with apical spikes or lobes (Figs. 29 G, 56 B, D). Included are *Uduba rakotozafy* and *U. rajery*. The branched MA and elongate TA2 suggest a relationship between the *Uduba rajery group* and the *Uduba valiha group*. It is unfortunate that no females of the included species are known.

**VI. *Uduba danielae* group.** This is another small group comprising only two new species (Map 20), in this case each only known from a unique female, both of which have a divided cribellum. The epigyna are strikingly similar but the vulval path differs between species. The affinities of this group are obscure, although the spermathecal ducts that are visible through the epigynal cuticle arching anterior of the epigynal plate (Figs. 70 A, C) suggest a relationship to the *Uduba valiha group*. Included in the *Uduba danielae group* are the new species *Uduba jayjay* and *U. danielae*.

**Unclassified species.** Finally, we have four species that have no clear morphological affinities to the diagnostic characters of the previously defined species groups (Map 21). Two new species, each only known from females from a single collecting event, both have a divided cribellum. *Uduba sarotra* has a vulva that spirals (Fig. 70 E) in a manner reminiscent of the *Epigynal atrium group* but the epigynum of this species lacks a median lobe and atrium (Fig. 70 D), though the lateral longitudinal ridge may be homologous to the atrial ridge and the median longitudinal ridge may be homologous to the median lobe. *Uduba ida* from Analamazaotra is unique (Figs. 73 C, F). The spermatheca that make several spirals on a longitudinal path resemble some *Ambohima* (Phyxelididae) and Symphytognathoidae, e.g., Mysmenidae and Theridiosomatidae, but the oval calamistrum and divided cribellum suggest placement of this enigmatic species in *Uduba*. *Uduba lakroa* is new species known from four males from a single collection at Mt. Papango. The species appears to have a divided cribellum. The palp morphology is distinctive: the TA2 and TA3 cross, they have a sclerotized lobe beneath TA2 and a pale concavity lateral to the TA3 base (Figs. 48A–C). Last, the ecribellate (Fig. 20 E) type species of the genus, *Uduba madagascariensis* (Vinson, 1863), is also difficult to relate to other species. The trapezoidal median lobe of the female epigynum is unique, but the vulva spirals in a manner reminiscent of the *Epigynal atrium group* (Figs. 68 A–D, 69 A–G, 80 C). On the male palp (Figs. 29 C, 51 A–C, 52 B, D, E) we find that the TA2 and TA3 interact, which is reminiscent of the *Uduba woodae group* and also of *Uduba lakroa*.

**Predictions from our classification.** Some predictions are possible from our classification. We expect that when discovered, females of the unassociated species classified in the *Uduba woodae*, *Uduba funerea* and *Uduba dahli groups* should have an epigynal atrium and a vulva that spirals. The currently unassociated females of *U. funerea* Simon 1906 and the new species *U. bar-*

*barae*, *U. lavitra*, *U. milamina* and *U. orona* will probably go with males that have small MA and VTA, a short to small TA2 and a TA3 that is a crescent or screw. The females of the new species *Uduba volana*, *U. heliani* and *U. goodmani* will probably be associated with males that have a large, pointed TA2 that extends distally and that have an MA that is complexly branched. *Uduba rakotofrah*, a new species currently known only from a male, will probably be matched with a female that has a laterally projected epigynum. The new species *Uduba rakotozafy* and *U. rajery* will probably be matched with females that have elaborate processes on the epigynum. It is hard to imagine the male of the small, extraordinary new species *Uduba ida* except to expect that it will have a very long, whip-like embolus.

### Geography of *Uduba* and *Udubidae*

A principal aim of the Fisher-Griswold Arthropod Team and the Schlinger *et al.* Malaise Trap Surveys was to sample widely in Madagascar, and especially in the western, drier parts of the island that had been less well sampled in recent years than have the eastern forests and vicinities of the port cities. In addition our knowledge of *Uduba* spiders has benefitted from the effort of Dr Steve Goodman and members of the Field Museum of Natural History and Madagascar collaborators who have sampled widely for small vertebrates, catching many spiders at the same time, by Frontier Madagascar, and by the efforts of Vincent and Barbara Roth, who traveled extensively though the island in the early 1990's.

*Uduba* are known from most parts of Madagascar and seem to be absent only from the driest parts of the far south (Fig. 85). Although the Fisher-Griswold and Schlinger *et al.* surveys did make collections in the driest parts of the island, even at Cape Saint Marie in the far south, no *Uduba* were collected there. The vast areas of burned-over grassland in the central uplands of the island may also lack *Uduba*. The earliest *Uduba* species discovered, which are *U. madagascariensis* (Vinson, 1863) (Maps 4 and 21), *U. dahli* Simon 1903 (Maps 2 and 13) and *U. funerea* Simon 1906 (Maps 2 and 15), seem to have been collected in semiarid, inhabited parts of the island. At least *U. madagascariensis* occur in a variety of semiarid and also disturbed habitats including native forest on the plateau, dry forests in the west and southwest, in *Uapaca* forest and even in disturbed areas near the large city of Antananarivo (Map 4). A few species are recorded from dry forests and spiny forest in semi-open formations, though no species is clearly restricted to such localities. The majority of *Uduba* species have been found in wet forests, from low elevation to montane habitats. At least *Uduba barbarae* have been collected at near sea level in Lokobe Forest (Map 4) and individuals of *U. woodae* (Map 8) and *U. taralily* (Map 10) have been collected at less than 50 m elevation, although neither of these species is restricted to low elevation. By contrast many species have been collected in montane forest: records of *U. goodmani* at 1990 meters in Reserve Andringitra (Map 6) represent the highest elevation for *Uduba* yet known.

The species *Uduba balsama* and *U. woodae* are predominantly known from dry parts of Madagascar (Map 14). *Uduba balsama* are widely distributed in the drier parts of western Madagascar with at least one outlier from wet rainforest in the northeast (Map 11). Individuals of *U. balsama* have been collected in dry habitats in southwestern Madagascar, i.e., from spiny forest at 825 m elevation in Zombitse National Park, tropical dry forest at 100m elevation in Forêt de Kirindy and from yellow pan traps in gallery forest on sandy soil in the Mackay Mountains. Some individuals of presumed *U. balsama* have been collected in lowland rainforest from 400-800m near Marojeje in northeastern Madagascar, which indicates that this species may not be restricted to dry habitats. The species *U. woodae* also appears to occur mainly in dry parts of Madagascar (Map 8) and is recorded from dry deciduous forest, tropical dry forest, in transitional dry forest at Andohahela,



*Uapaca* forest and even spiny forest: this may be a unique dry forest specialist. But, as is the case in *U. balsama*, there is a unique collection of a *U. woodae* from a wet area at Anjaraharibe-Sud. The species pair *Uduba rinha* and *U. irwini* occurs predominantly on the western side of the great escarpment (Maps 3, 18). *Uduba rinha* are recorded across the northern half of Madagascar and *Uduba irwini* are recorded across the central and southern half of Madagascar on the high plateau and in western dry forests.

Because we have no cladogram for *Uduba* species it is difficult to discuss the distributions of related species. Within our provisional species groups most species are allopatric. There is one apparent case of sympatry (Map 16) for the closely-related species *U. evanescens* (Map 7) and *U. pseudoevanescens* (Map 4). At the rich *Uduba* site of Ranomafana in southeastern Madagascar (Fig. 87), females of *U. pseudoevanescens* have been collected on 5 March and 19-20 July 1992 by V. and B. Roth, whereas males and females of *U. evanescens* have been collected in the Ranomafana area virtually throughout the year. The absence of collections *U. evanescens* in August and September seems only to be an artifact of fieldwork. Sympatry between sister species pairs of spiders has been recognized previously from Madagascar. For example, the phyxelidid sister species pairs *Ambohima zandry* and *A. avaratra* and *Rahavavy ida* and *R. fanivelona* have been recorded in sympatry (Griswold *et al.*, 2012: 754-755).

**Communities of sympatry of *Uduba*.** The extensive collecting efforts undertaken over the last 25 years has enabled us to focus efforts and even to return to some sites multiple times. Some places have been particularly notable for the rich community of *Uduba* that occur in geographic sympatry (Figs. 86, 87). Even though we have more than 30 years of intensive sampling we still cannot account for the possibility of apparent geographic differences in species distributions that may in fact be due to elevation, season, or even to climate change. Our discoveries reveal the richest communities of *Uduba* sympatry along the mountain spine on the wet, eastern side of the island. A few localities in the arid west are also notable. Two species are known from Namoroka (Fig. 87), (*Uduba rinha* and the endemic *Uduba lehibekokoa*), two from Tsingy de Bemaraha (Fig. 87) (*Uduba balsama* and *U. irwini*), two from Forêt de Milua (Fig. 87) (*Uduba taralily* and *U. woodae*) and three species are known from the isolated southwestern patch of semiarid forest at Analavelona (Fig. 87) (*Uduba irwini*, *U. madagascariensis* and *U. schlingeri*). An isolated patch of montane forest in the far north at Montagne d'Ambre (Fig. 86) revealed two sympatric species: the widespread *Uduba schlingeri* and the endemic *U. salegy*. A large area of little explored mountain forest in the northeast stretching across a river valley from Marojejy to Anjanaharibe-Sud (Fig. 87) hosts at least five species: the widespread *Uduba balsama*, *U. lamba* and *U. woodae* and the endemic *Uduba sarotra*. *Uduba platnicki* (Map 2) occurs in this forest and also in the rich forests of the Masoala Peninsula, just to the south. The northeastern forests of Madagascar are renowned for richness and endemism and promise many more discoveries from some of the least explored parts of the island. The tiny remnant sacred forest at Ambohimanga near the capital Antananarivo (Fig. 86) is home to two sympatric species, the widespread *Uduba madagascariensis* and the endemic *Uduba volana*: this forest probably represents a formation that was widespread on the central plateau of Madagascar before the arrival of people. Another small remnant forest in central Madagascar at Ambohitantely (Fig. 87) hosts at least four sympatric species: the widespread *Uduba evanescens* (Dahl, 1901), *U. fandroana* and *U. irwini* and the endemic *Uduba danielae*. There is a biogeographic pattern in Madagascar that is commonly known as the "Périnet effect" (Lees, 1996). As part of this pattern the highest levels of richness and endemism are recorded from the middle of the island rather than in the north or south: these foci of richness may be related to mid-latitudinal and mid-elevational peaks in richness that arise from overlapping ranges of widespread species at these mid zones. This pattern is not exhibited by *Uduba*. There are places rich in

species at and near Périnet, but higher levels of sympatric richness have been found in forests to the south. At the mountain forest at Anjozorobe (Fig. 86), we have *Uduba fandroana*, *U. fisheri* and the endemic *Uduba jayjay*. At the famous region of Périnet itself (Analamazaotra, Mitsinjo and Périnet, (Fig. 86) we know of four sympatric species. These include *Uduba pseudoevanescens* and *U. rinha* and the endemics *Uduba ida* and *U. rakotozafy*. The species *Uduba lavitra* is known only from two nearby localities in montane rainforest where their forest habitat is threatened by a huge chrome-ore strip mine (Map 8). Areas of the highest sympatric richness are in the south and far south of the eastern mountain spine. At the far southern locality of Andohahela (Fig. 86) four sympatric species are known: the widespread *Uduba halabe*, *U. schlingeri* and *U. woodae* and the endemic *Uduba goodmani*. Ranomafana (Fig. 87), a famous lemur locality (Wright, 1997; Wright and Andriamihaja, 2003), which includes the localities Bellvue, Vatoharanana, Talatakely and Vohiparara, hosts eight sympatric species: *Uduba evanescens* (Dahl, 1901), *U. fandroana*, *U. halabe*, *U. kavanaughi*, *U. milamina*, *U. pseudoevanescens* and *U. schlingeri* and the endemic *Uduba ibonia*. Finally, at the southern massif of Andringitra-Ivohibe (Fig. 87) we find nine species in sympatry: *Uduba andriamihajai*, *U. evanescens* (Dahl, 1901), *Uduba halabe*, *U. lamba*, *U. milamina*, *U. schlingeri*, *U. valiha* and the endemics *Uduba hainteny* and *U. orona*. The Périnet (Fig. 86) area has the highest proportion of endemics (3/5), which is a higher proportion than at Andringitra-Ivohibe (2/9) (Fig. 87).

**Transcontinental Biogeography.** *Uduba* were previously discussed as a component of a transcontinental vicariant distribution including America, Africa, Madagascar and Sri Lanka (Griswold, 2000: 352, fig. 3). That paper on Afromontane “Zorocratidae” is partially obsolete: molecular phylogenetics studies have suggested that the “Zorocratidae” of that discussion is not a natural group. Recently analyses by Polotow *et al.* (2015) and Wheeler *et al.* (2017) suggest that *Zorocrates* can no longer be seen as closely related to *Uduba*. In those same studies a close phylogenetic relationship between *Raecius* (Africa), *Uduba* and *Zorodictyna* (Madagascar) has been corroborated by molecular and morphological data (Polotow *et al.*, 2015) to comprise the core of the family Udubidae Griswold and Polotow 2015. The placement of the genus *Campostichomma* from Sri Lanka, previously allied to *Uduba* by morphological data (Griswold, 1993), remains unchallenged. We still have evidence for a transcontinental distribution of a clade, here of the Udubidae, but vicariance with the Americas is no longer part of the picture.

## Conclusion

Collection of fresh DNA material will allow access to extensive molecular data for matching males and females and also for phylogenetic analysis. Within *Uduba* we have an extraordinary array of genitalia and an unprecedented variety of spinning organs. Similarly, the closely related udubid genus *Zorodictyna* also presents an extraordinary array of genitalia and spinning organs. A supported phylogeny will shed light on the evolution of these structures and the lifestyles that they facilitate. The prevalence, richness and dominance of Udubidae in Madagascar is unique in the world. Madagascar is an island relatively poor in wolf spiders (Lycosidae) and tropical wolf spiders (Ctenidae) (Wood and Griswold 2022); spiders with similar lifestyles to Udubidae. In the relative absence of these competitors, udubids have gone absolutely wild!

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### **Illustrations**

**Specimen images (Figures 1–84 [pages 106–172]) and  
distribution maps (Figures 85–87 [173–175] and Maps 1–24 [176–187])**

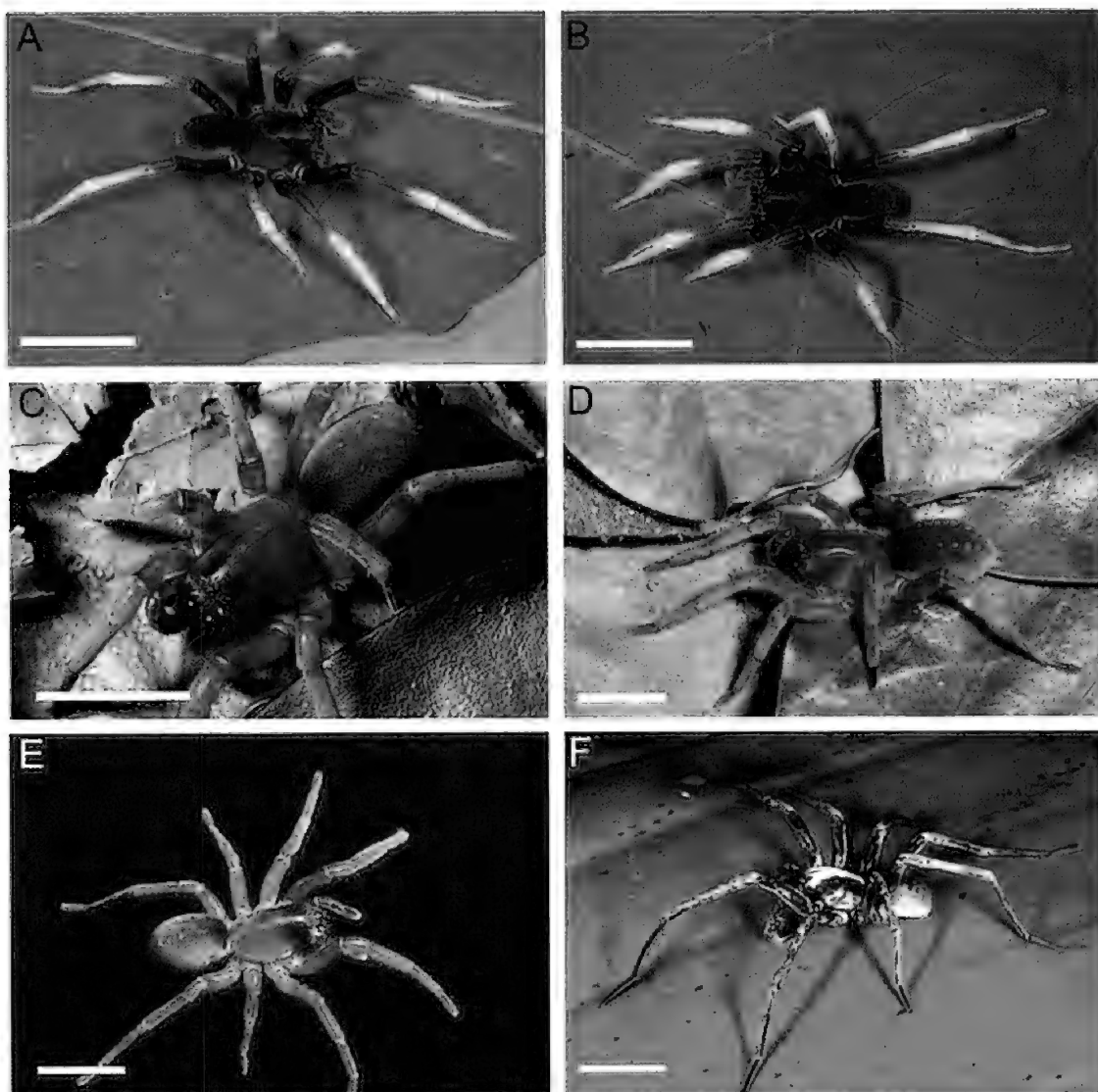


FIGURE 1. *Uduba* spp., live individuals. A, B. *U. kavanaughi*, Holotype ♂ (CASENT9029870) from evergreen forest at 970m elevation at Talatakely, Parc National Ranomafana, January 2009. C, D. *U. kavanaughi*, Paratype ♀, CASENT9003517, Talatakely, 1.68 km SW Ranomafana, Parc National Ranomafana, January 2009. E. *U. kavanaughi*, Juvenile ♀, Parc National Ranomafana, April 1998. F. *U. madagascariensis* (Vinson, 1863), ♂ CASENT9006030, specimen from suburbs of Antananarivo. Photos A, B, F by Nikolaj Scharff, C, D by Charles Griswold, E by Dong Lin. Scale bars = 10 mm.

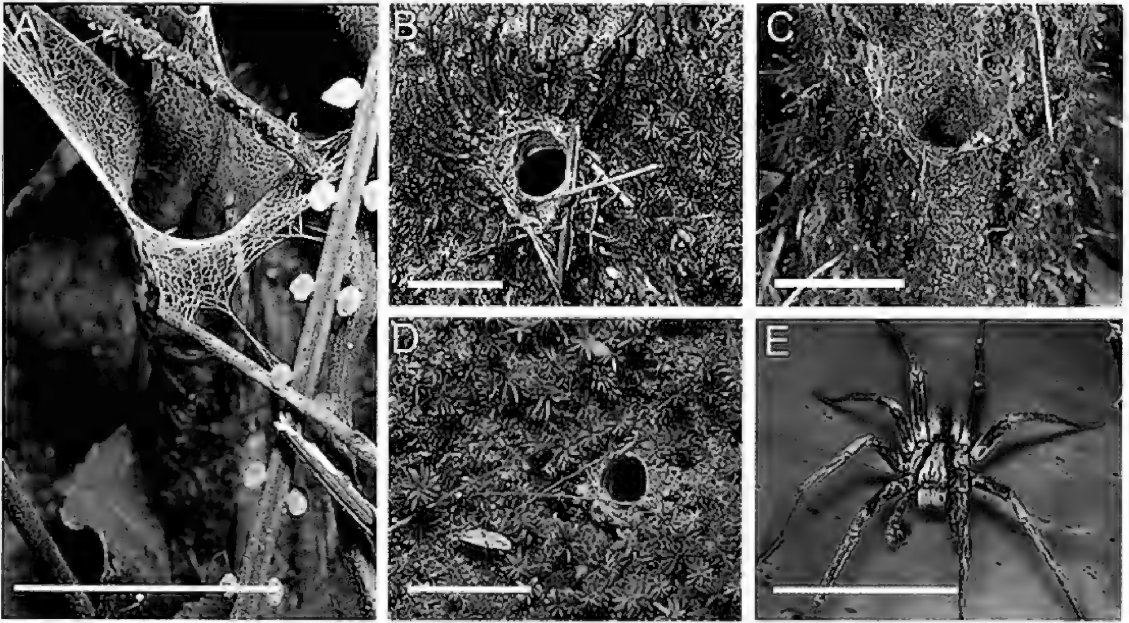


FIGURE 2. *Uduba* spp., nests and live individuals. A, C, *U. schlingeri*, ♀, CASENT9006058. B, D, *U. evanescens* (Dahl, 1901), ♀, CASENT9006088. A. Tubular nest surmounted by funnel of cribellate silk, Ranomafana. B. Nest opening on soil surface, Ranomafana. C. Tubular nest, Ranomafana. D. Nest opening on soil surface, Ranomafana. E. *U. madagascariensis* (Vinson, 1863), ♂ CASENT9006030, specimen from suburbs of Antananarivo. A–D. Photos by Dong Lin, Ranomafana, April 1998. E. Photo by Nikolaj Scharff, November 1993. Scale bars = 20 mm.



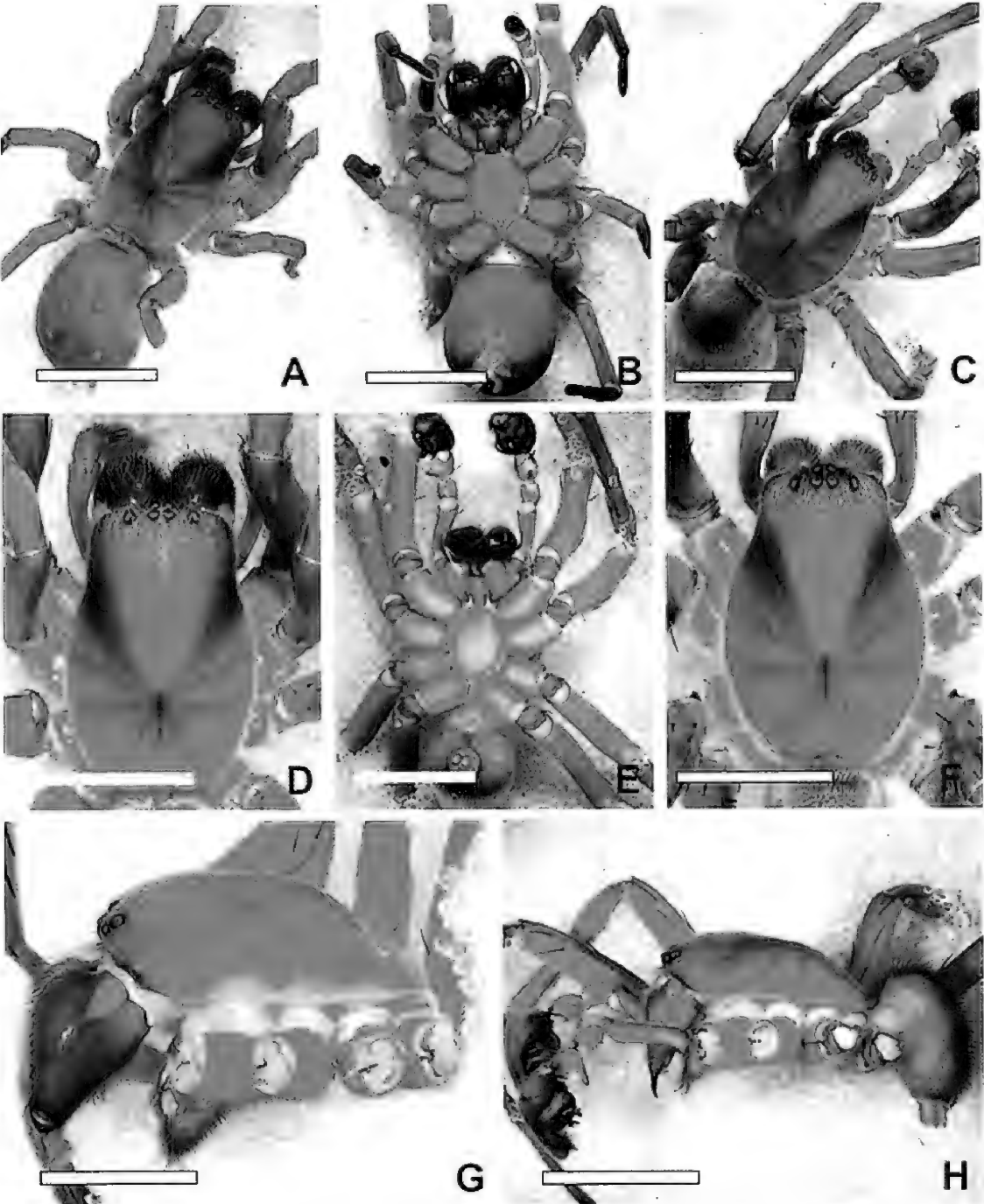


FIGURE 3. Habitus photos of *Uduba schlingeri* from Parc National Ranomafana. A, B, D, G. Female ♀ (CASENT9006075). C, E, F, H. ♂ Holotype male (CASENT9006052). A. Dorsal. B. Ventral. C. Dorsal. D. Carapace, dorsal. E. Ventral. F. Carapace, dorsal. G. Carapace, lateral. H. Carapace, lateral. Scale bars = 5 mm.

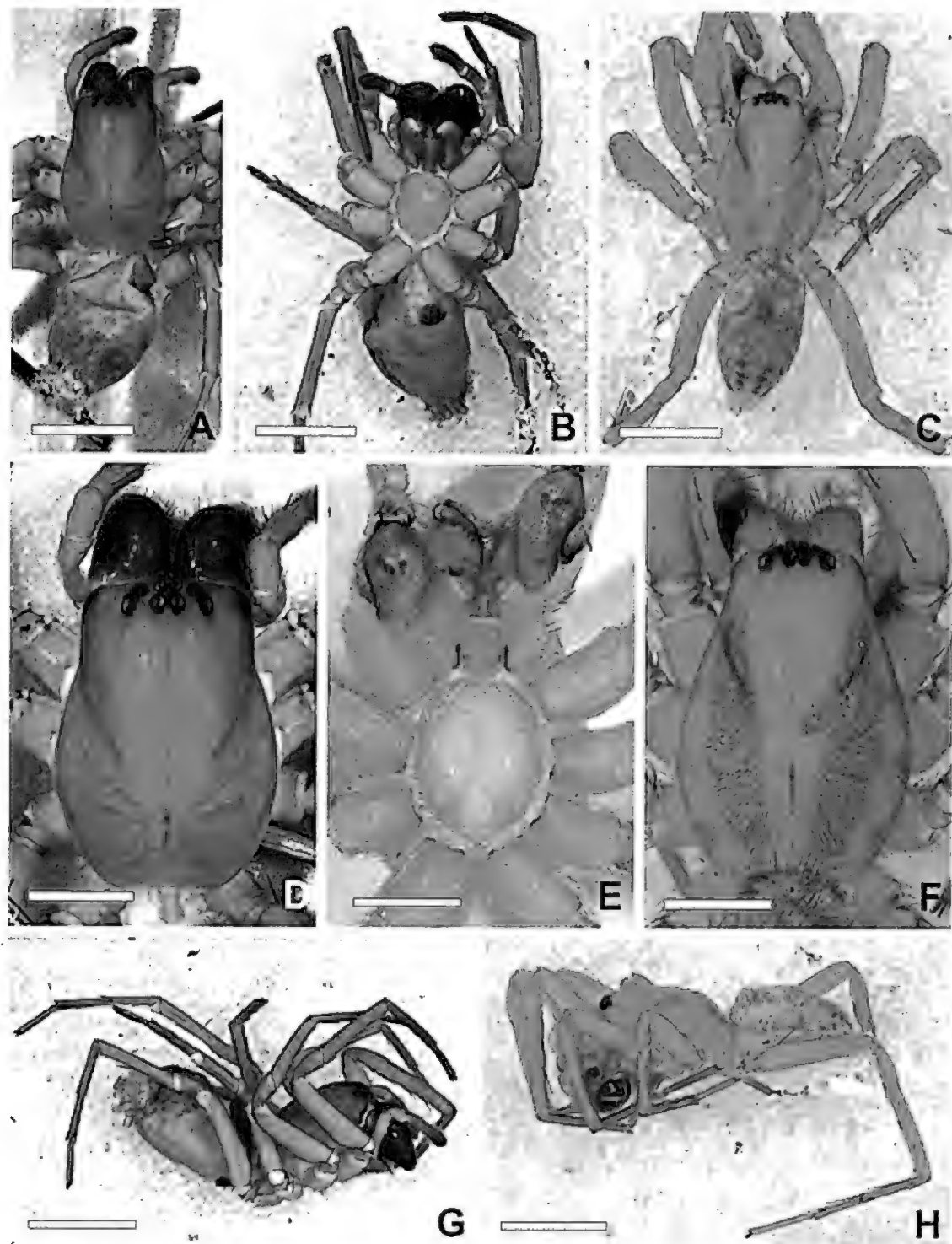


FIGURE 4. Habitus photos of *Uduba fisheri* from montane rainforest at 3 km 41° NE Andranomay, 11.5 km 147° SSE Anjozorobe. A, B, D, G. Paratype female ♀ (CASENT9026388). C, E, F, H. ♂ Holotype male (CASENT9025464). A. Dorsal. B. Ventral. C. Dorsal. D. Carapace, dorsal. E. Carapace, ventral. F. Carapace, dorsal. G. Lateral. H. Lateral. Scale bars: A–C, G, H = 2mm, D–F = 1mm.

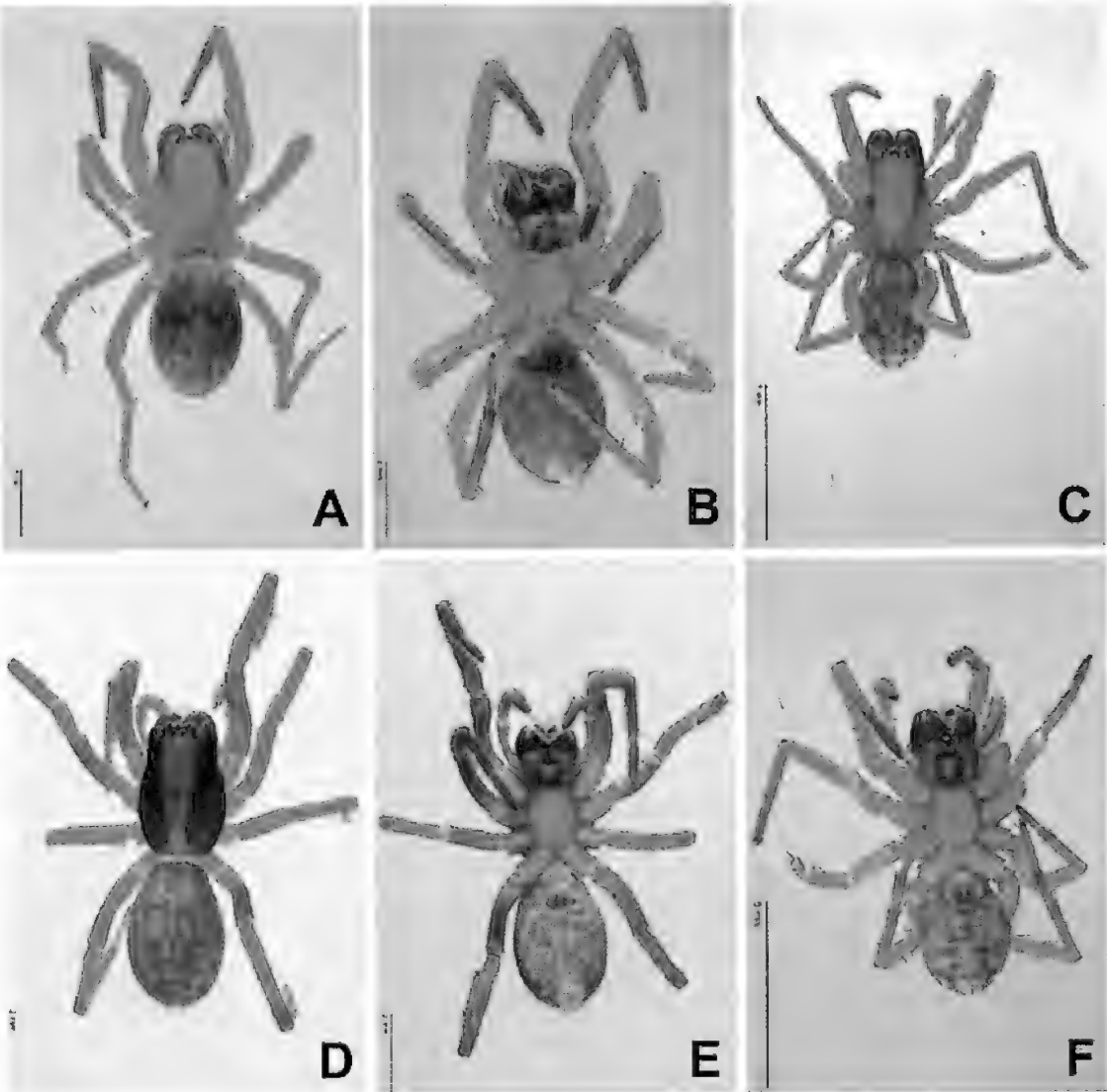


FIGURE 5. Habitus photos of *Uduba* spp., females. A, B. *U. danielae*, Holotype (CASENT9007875) from montane rainforest at 1620m elevation in Jardin Botanique at Réserve Spéciale d'Ambohitantely. C, F. *U. jayjay*, Holotype (CASENT9004079) from montane rainforest at 3 km 41°NE Andranomay, 11.5 km 147°SSE Anjozorobe. D, E. *U. heliani*, Holotype (CASENT9006106) from Forêt Classée Andriantantely. A, C, D. Dorsal. B, E, F. Ventral. Scale bars: A, B, D, E = 2 mm. C, F = 5 mm.

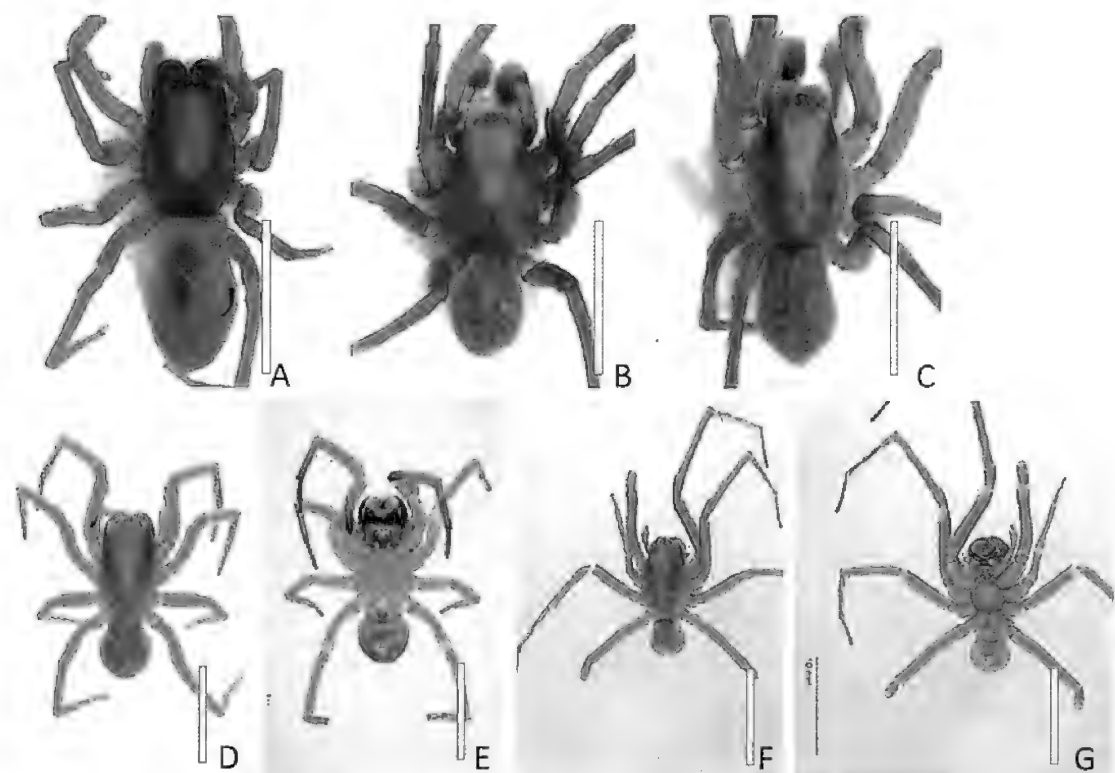


FIGURE 6. Habitus photos of *Uduba* spp. A. *U. valiha*, female Paratype (CASENT9006071) from Massif Andringitra, dorsal. B. *Uduba andriamihajai*, new species, male (CAS9006077) R. S. Ivohibe, dorsal. C. *U. madagascariensis* (Vinson, 1863), CASENT9006029 male from forest near Ambohimanga, village (CASENT9006029), dorsal. D, E. *U. rinha*, female (CASENT9006108) from R.S. Manongarivo, dorsal and ventral. F, G. *Uduba lamba*, Betampona male. (CASENT9042542) dorsal and ventral. Scale bars: A–E = 5mm, F, G = 10 mm.

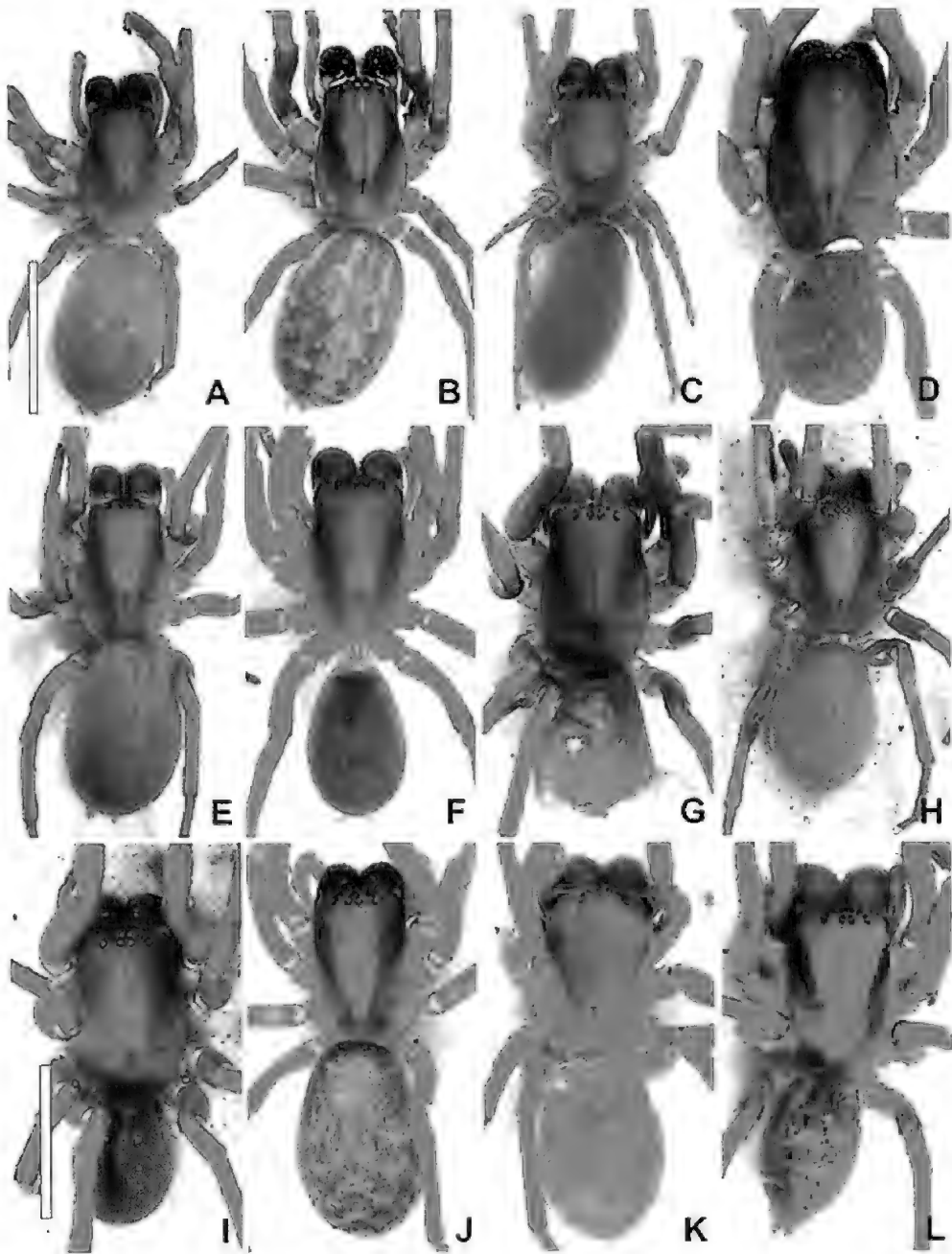


FIGURE 7. Habitus photos of *Uduba* spp., females, dorsal views. A. *U. pseudoevanescens*, CASENT9006007, from Forêt Marovato, MNHN Paris. B. *U. evanescens* (Dahl, 1901), CASENT9006090 from Ranomafana National Park. C. *U. volana*, Holotype (CASENT9006072) from 1400m elevation at Ambohimanga. D. *U. goodmani*, Holotype (CASENT9006074) from Réserve Naturelle Intégrale d'Andohahela. E. *U. salegy*, Paratype (CASENT9006045) from Parc National Montagne d'Ambre. F. *U. ihonia*, CASENT9006033 from Ranomafana National Park. G. *U. schlingeri*, CASENT9006075 from Parc National Ranomafana. H. *U. barbarae*, paratype (CASENT9006064), from Lokobe Forest on the island of Nosy Be. I. *U. kavanaughi*, paratype (CASENT9003517) from Parc National Ranomafana. J. *U. woodae*, paratype (CASENT9017834) from spiny forest at Lake Ranobe. K. *U. woodae*, CASENT9006092 from Ambovombe, Carougeau, Muséum Paris. L. *U. madagascariensis* (Vinson, 1863), CASENT9006029, from forest near village of Ambohimanga. Scale bars (see A, I) = 5 mm.



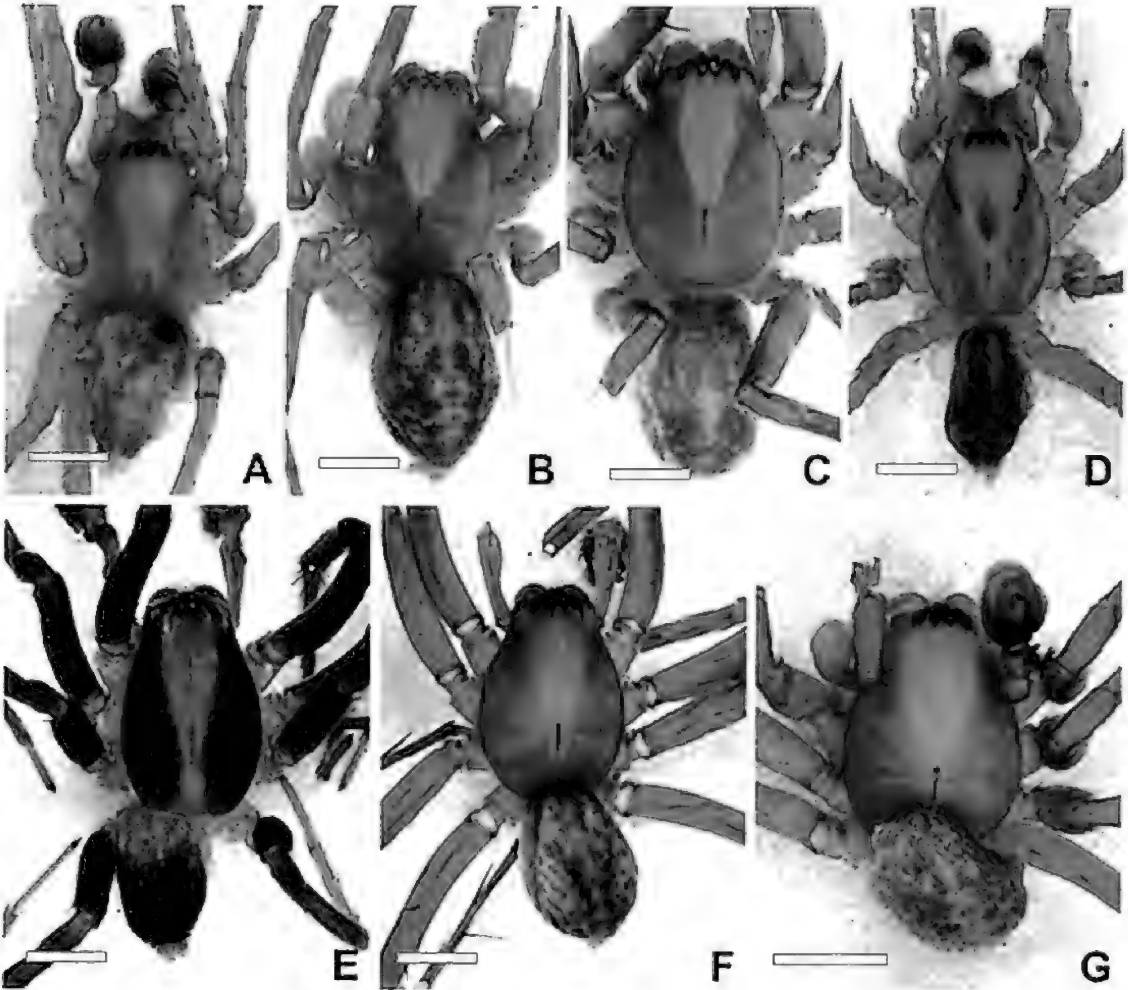


FIGURE 8. Habitus photos of *Uduba* spp., males, dorsal views. A. *U. rinha*, MRAC174.445 from 25 km W Morarano Chrome, Toamasina Province. B. *U. pseudoevanescens*, Paratype (CASENT9006006) collected at 57 km Route d'Anosibe de Moramanga. C. *U. evanescens* (Dahl, 1901), (CASENT900687) from Ranomafana. D. *U. fisheri*, (CASENT9002693) from montane rainforest near Anjozorobe. E. *U. rajery*, Holotype (CASENT9026393) from littoral rainforest in Forêt Ambohidena, Ile Sainte Marie. F. *U. valiha*, Holotype (CASENT9026394) from Forêt de Vevembe. G. *U. rakotozafy*, Holotype (CASENT9006024) from forest at Parc National Périnet. Scale bars = 2 mm.

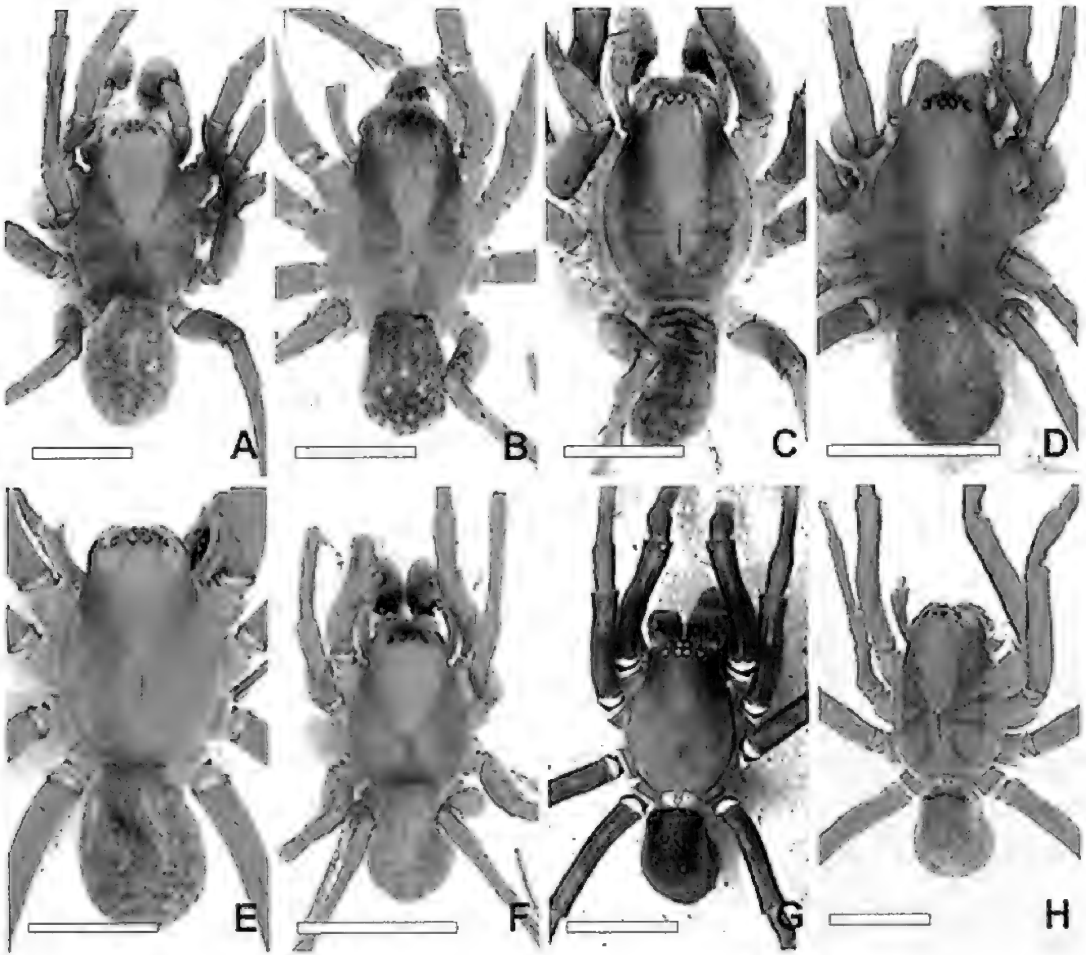


FIGURE 9. Habitus photos of *Uduba* spp., males, dorsal views. A. *U. schlingeri*, (CASENT9006077) from R. S. de Ivohibe. B. *U. woodae*, CASENT9017831 from Lake Ranobe. C. *U. lehibekokou*, Holotype (CASENT9017929) from tropical dry forest in Parc National de Namoroka. D. *U. salegy*, Holotype (CASENT9006044) from montane rainforest in Parc National Montagne d'Ambre. E. *U. ibouia*, CASENT9006034 from Parc National Ranomafana. F. *U. fandroana*, CASENT9006103 from Forêt d'Ankazomivady. G. *U. kavanaughi*, Holotype (CASENT9029870) from evergreen forest in Parc National Ranomafana. H. *U. lamba*, Holotype (CASENT9042542) from rainforest in Réserve Nationale Intégrale Betampona. Scale bars: A–F, H = 5 mm, G = 10 mm.

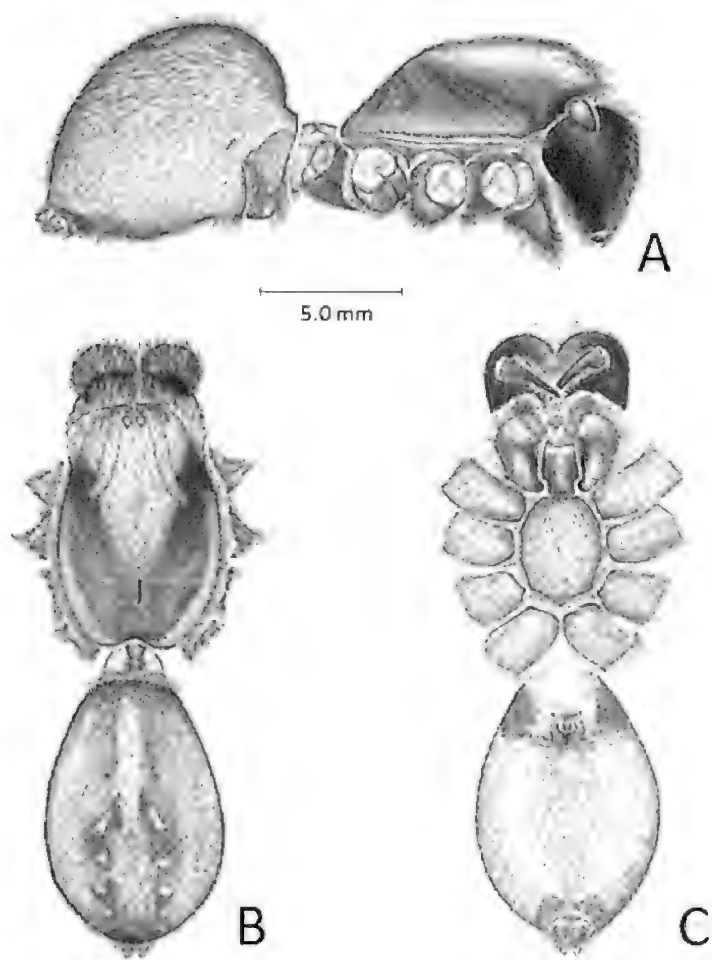


FIGURE 10. Habitus drawings, *Uduba barbarae* ♀ (CASENT9066066), Nosy Be Island. A. Lateral. B. Dorsal. C. Ventral. Illustrations by Jenny Speckels. Scale bar = 5.0 mm.

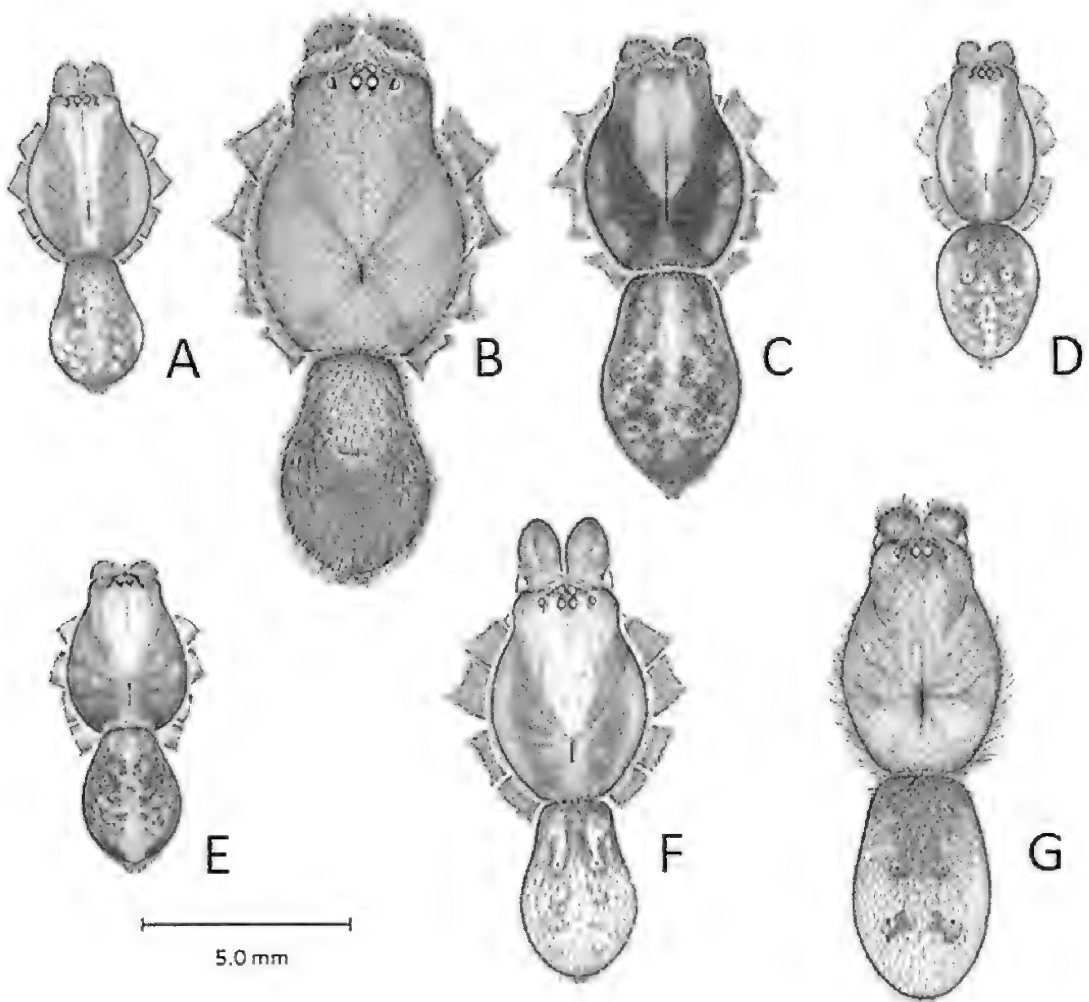


FIGURE 11. Habitus drawings, *Uduba* ♂♂, dorsal views. A. *U. salegy*, Holotype (CASENT9006044) from Parc National Montagne d'Ambre. B. *U. halabe*, Paratype, (CASENT9006017) from Parc National Ranomafana. C. *U. pseudoevanescens*, Paratype (CASENT9006006) from Route d'Anosibe de Moramanga. D. *U. rinha*, (MRAC174.445) from 25 km W Morarano Chrome, Toamasina Province. E. *U. rakotozafy*, Holotype (CASENT9006024) from Parc National Périnet. F. *U. ibonia*, Holotype (CASENT9006038) from 7 km W Ranomafana. G. *U. schlingeri* (CASENT9006061) from 7 km W Ranomafana. Illustrations by Jenny Speckels. All to same scale, scale bar = 5.0 mm.

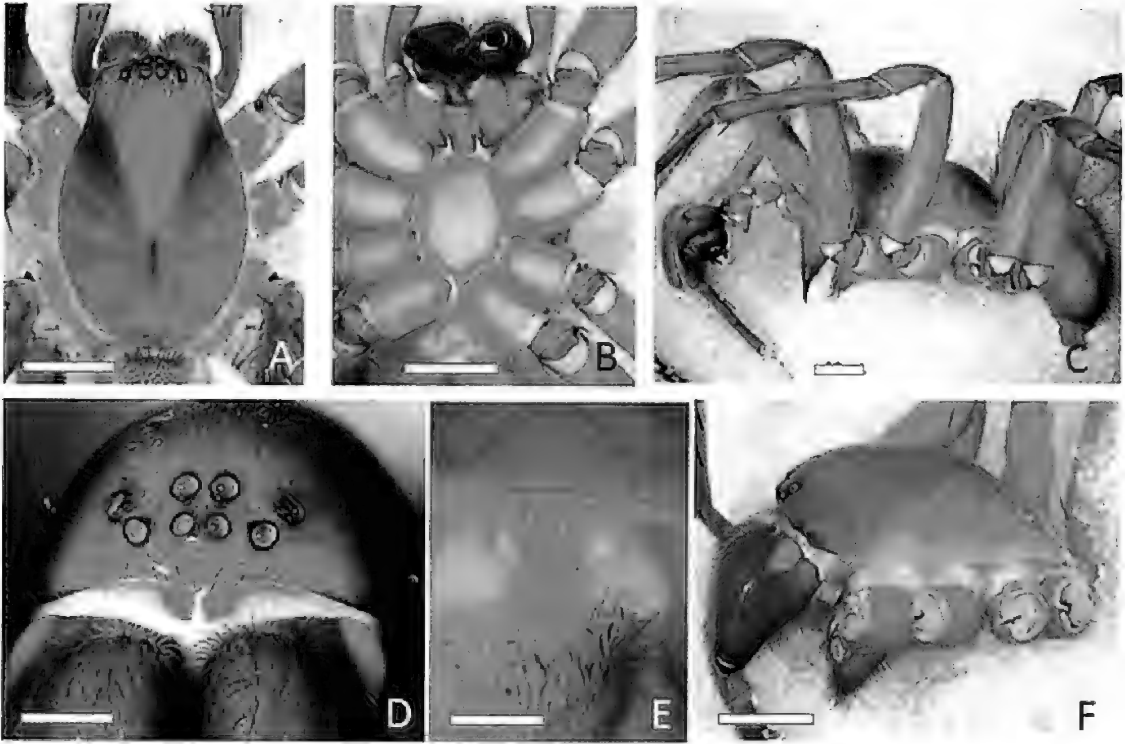


FIGURE 12. *Uduba* spp., morphology photos. A–C. *U. schlingeri*, ♂ CASENT9006052 from Talatakely, Ranomafana National Park. D, F. *U. schlingeri*, ♀ CASENT9006075 from Vatoharanana, Ranomafana National Park. E. *U. fisheri*, ♀ CASENT9026389 from Anjozorobe. A. Cephalothorax, dorsal. B. Cephalothorax, ventral. C. Habitus, lateral. D. Face, clypeus and divided chilum, anterior. E. Pedicel, dorsal (anterior to top). F. Habitus, lateral. Scale bars: A, B, F = 2 mm, C = 2 mm, D = 1 mm, E = 0.5 mm.

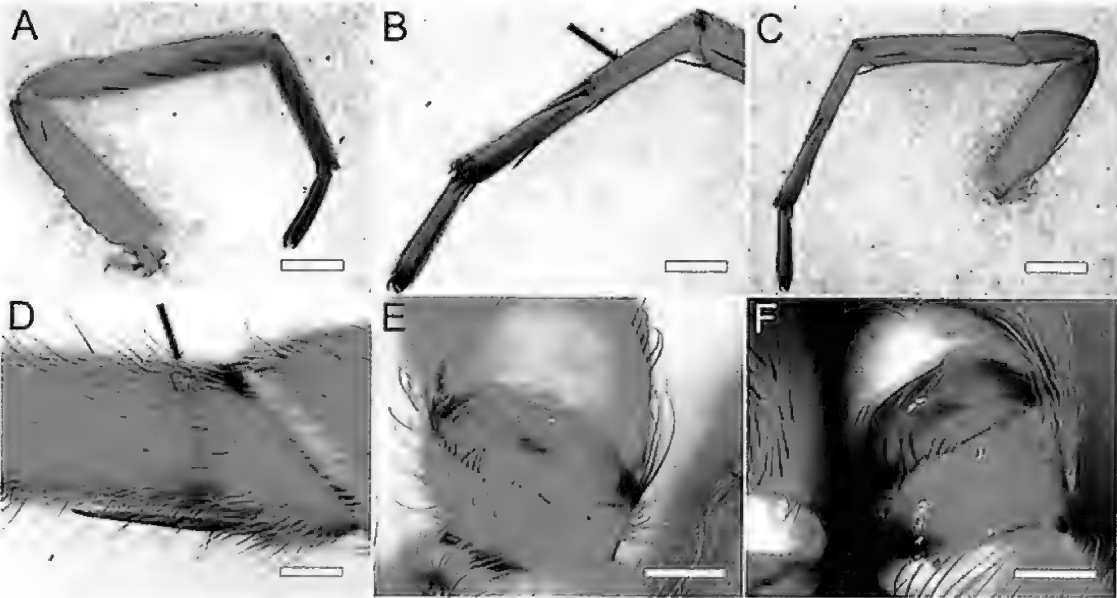


FIGURE 13. *Uduba schlingeri*, from Ranomafana National Park, leg photos. A–C, E, F. ♀ (CASENT9006075). D. ♂ (CASENT9006052). A. Leg I, prolateral. B. Metatarsus and tarsus IV, retrolateral, showing calamistrum-arrow to calamistrum. C. Leg IV, retrolateral. D. ♂ tibia II retrolateral, base showing tibial crack (arrow). E. Trochanter IV, left. F. Trochanter I, left. Scale bars: A, C = 2 mm, B = 1 mm, D, E, F = 0.25 mm



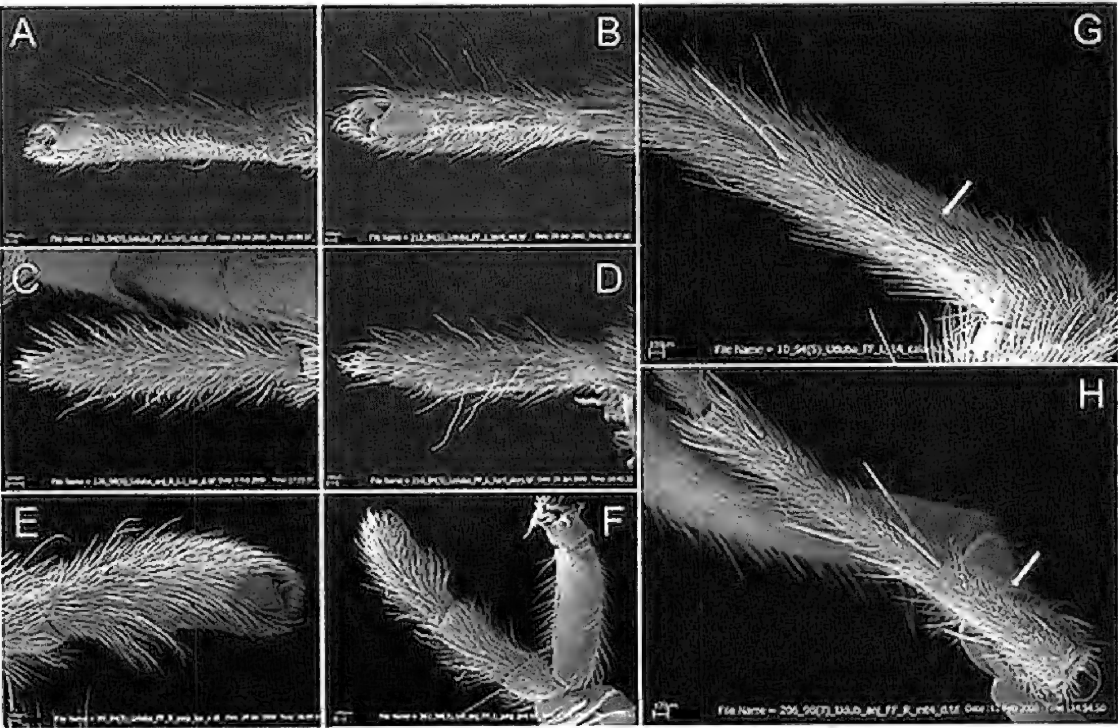


FIGURE 14. *Uduba* spp., females, legs, SEM. A–E, *U. schlingeri* ♀ (CASENT9025468) from Vatoharanana, Ranomafana National Park. F, H, *U. fisheri*, ♀ (CASENT9026389) from Anjozorobe. A, Tarsus I, left, retrolateral. B, Tarsus IV, left, retrolateral. C, Tarsus I, left, dorsal. D, Tarsus IV, left, dorsal. E, Palpal tarsus, right, retrolateral. F, Palpus, trochanter–tarsus, prolateral. G, Metatarsus IV base, retrodorsal, showing calamistrum [arrow]. H, Metatarsus IV, retrodorsal, showing calamistrum [arrow]. Scale bars = 100  $\mu$ m.

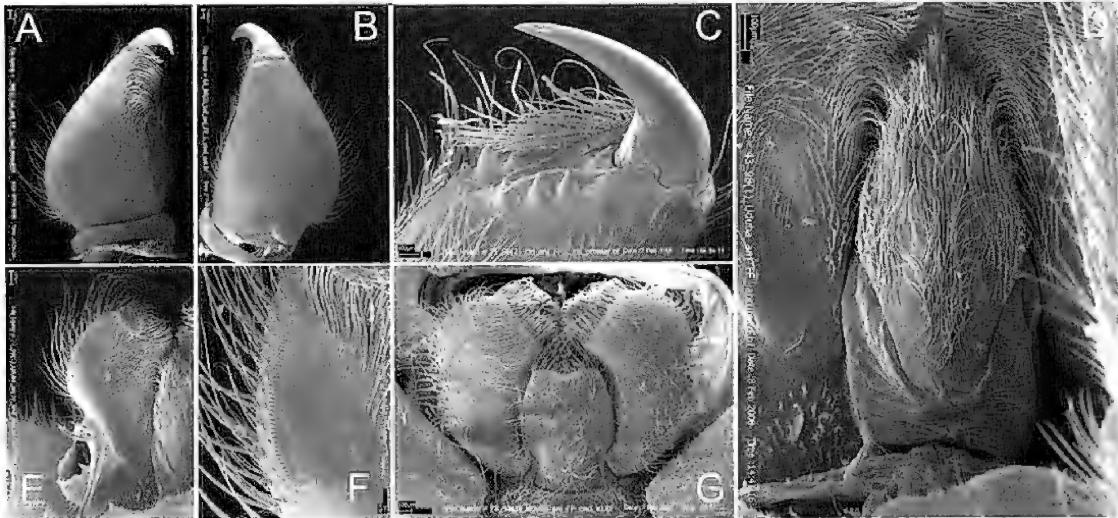


FIGURE 15. *Uduba fisheri*, female CASENT9026389 from Anjozorobe, mouthparts, SEM. A, Chelicera, left, mesal view. B, Chelicera, left, ectal view. C, Chelicera, left, viewed from retromargin of fang furrow. D, Labrum, dorsal, anterior to top. E, Left palpal coxa, dorsal. F, Left palpal coxa, dorsal, showing serrula. G, Labium and endites of palpal coxae, ventral. Scale bars = 100  $\mu$ m.

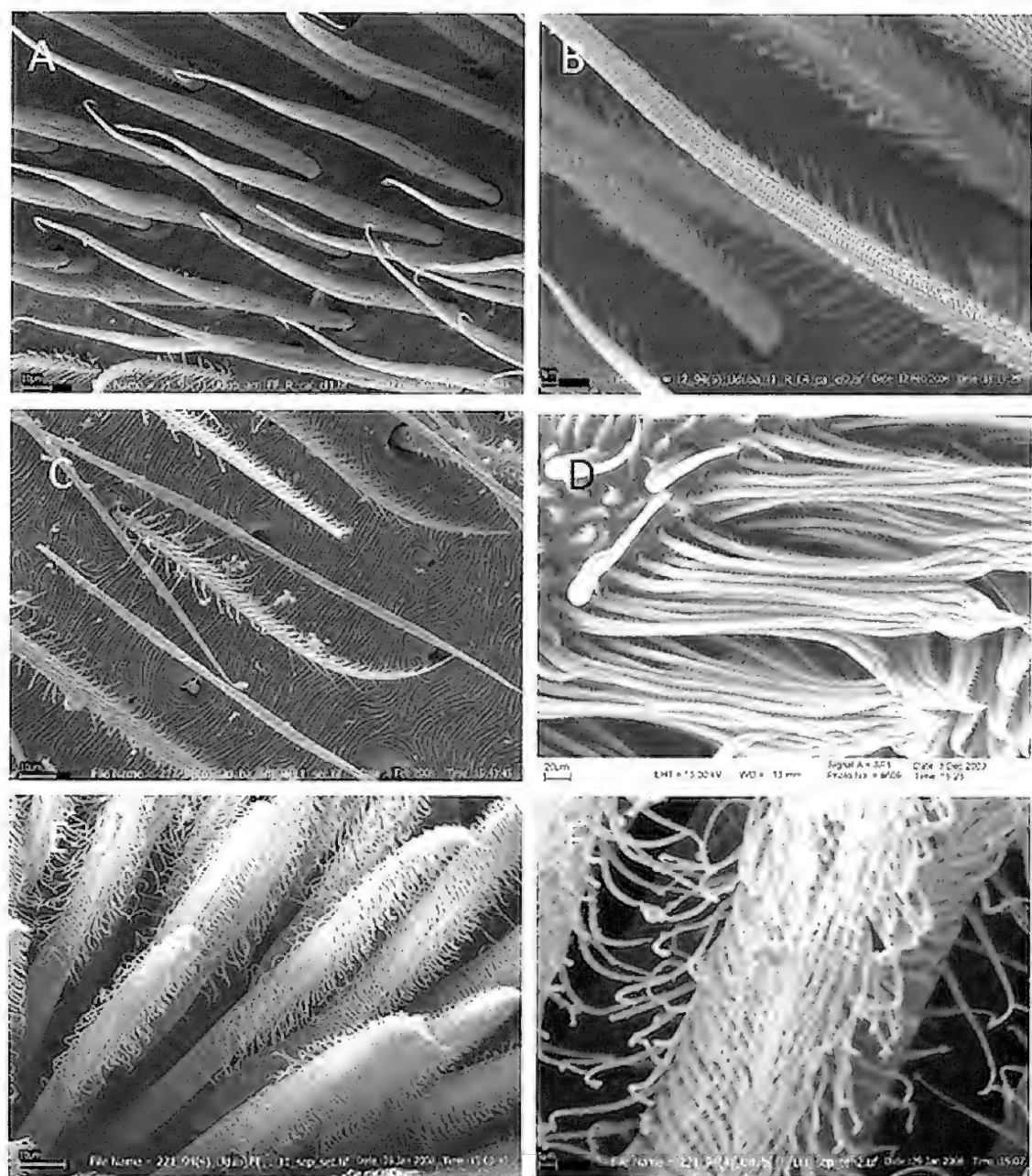


FIGURE 16. *Uduba* spp., setae, SEM images. A–C. *U. fisheri*, ♀ CASENT9026389 from 3 km 41°NE Andranomay, near Anjozorobe. D. *U. schlingeri*, ♀ CASENT9006056 from Talatakely, Ranomafana National Park. E, F. *U. schlingeri*, ♀ CASENT9025468 from Vatoharanana, Ranomafana National Park. A. Left metatarsus IV, calamistrum. B. Left metatarsus IV, calamistrum seta close-up. C. Right tibia I, leg setae. D. Tibia I, scopular base. E. Tarsus I, left, scopular setae. F. Tarsus I, left, scopular seta, close-up. Scale bars: A, C, E = 10  $\mu$ m, B = 3  $\mu$ m, D = 20  $\mu$ m, F = 1  $\mu$ m.

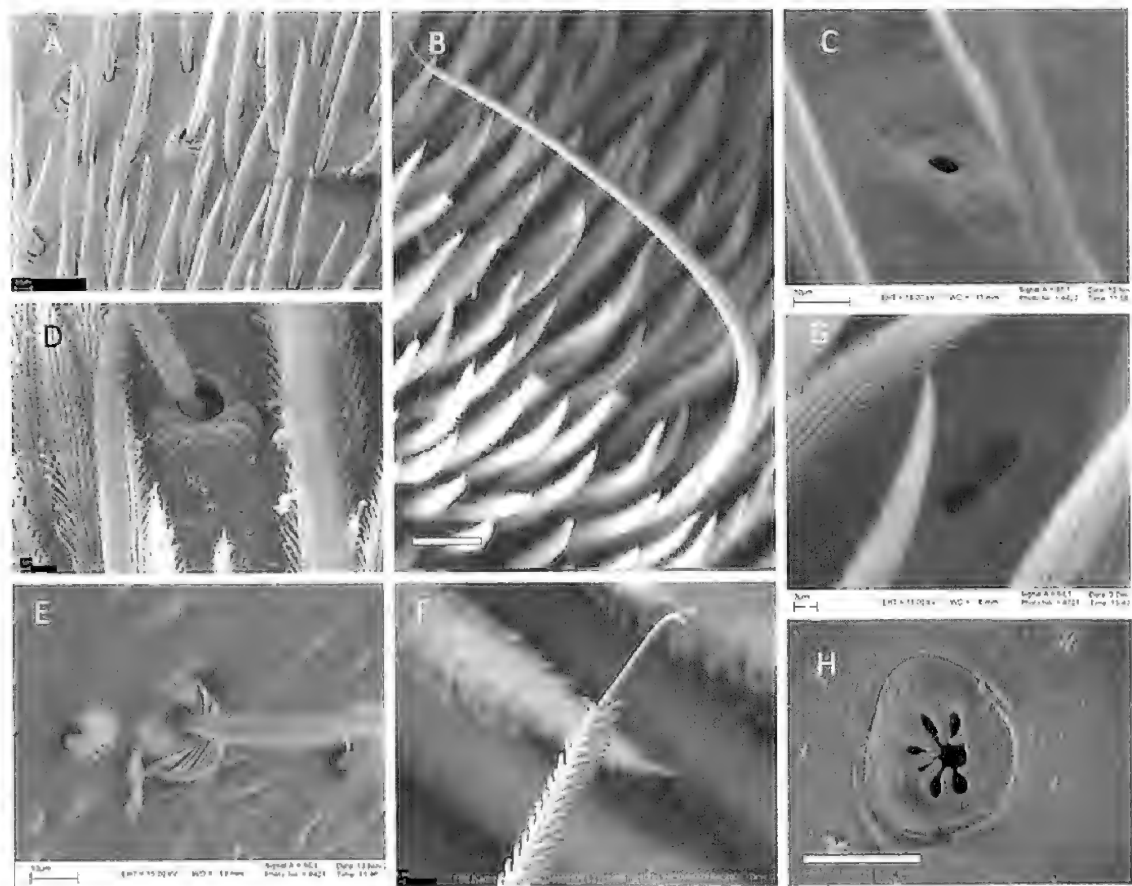


FIGURE 17. *Uduba* spp., sensilla, SEM images. A. *U. platnicki*, ♀ CASENT9030253 from Mikira Forest, tarsus I setae and trichobothrium. B, D, F. *U. schlingeri*, ♀ CASENT9025468, from Vatoharanana, Ranomafana National Park. B. Chemosensory seta, tarsus I. D. Tarsus IV, trichobothrial base. F. Chemosensory seta, tip, tarsus I. C, E. *U. schlingeri*, ♂ CASENT9006052 from Talatakely, Ranomafana National Park. C. Cymbium of palpus, tarsal organ. E. Palpal tibia, trichobothrial base. G. *U. schlingeri*, ♀ CASENT9006056 from Talatakely, Ranomafana National Park, tarsus I setae and tarsal organ. H. *U. fisheri*, ♂ CASENT9006056 from 3 km 41°NE Andranomay, near Anjozorobe, cymbium of palpus, tarsal organ. Scale bars: A, C, E = 10  $\mu$ m, B = 30  $\mu$ m, D = 2  $\mu$ m, F = 1  $\mu$ m, G = 3  $\mu$ m, H = 15  $\mu$ m.

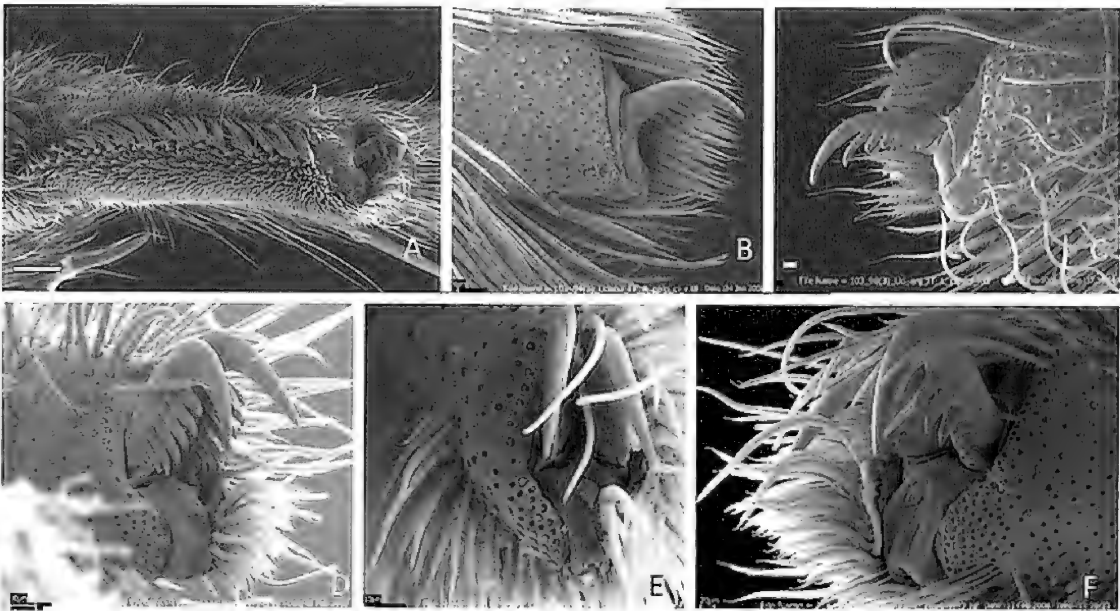


FIGURE 18. *Uduba* spp., claws and legs, SEM images. A. *U. schlingeri*, ♀ CASENT9006056 from Talatakely, Ranomafana National Park, tarsus I, retroventral. B. *U. schlingeri*, ♀ CASENT9025468 from Vatoharanana, Ranomafana National Park, right palpal claw, retrolateral. C–F. *U. fisheri*, ♀ CASENT9026389 from 3 km 41°NE Andranomay, near Anjozorobe. C. Palpal claw, retrolateral. D. Tarsal claws I, left, apical. E. Tarsal claws IV, left, apical. F. Tarsal claws IV, left, retrolateral. Scale bars: A = 200 µm, C, E = 10 µm, B, F = 20 µm, D = 30 µm.

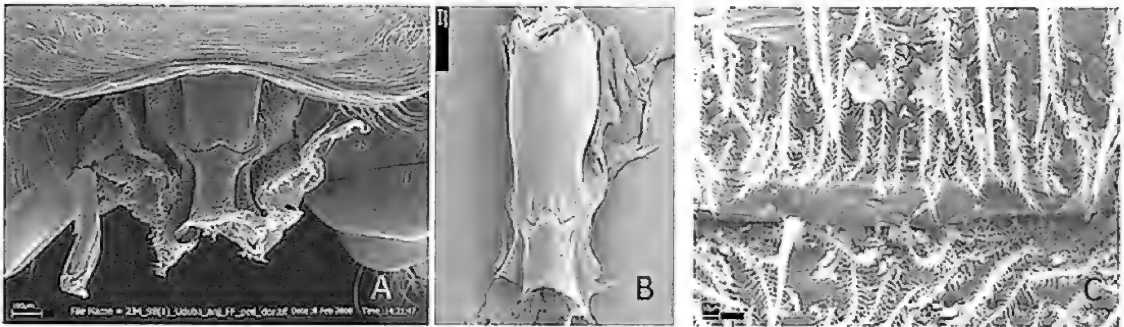


FIGURE 19. *Uduba* SEM images. A. *U. fisheri* (CASENT9026389) ♀ pedicel, dorsal. B. *U. platinicki* (CASENT9030253) ♀ pedicel, dorsal, anterior to top. C. *U. fisheri* (CASENT9026389) ♂ epiandrium, ventral. Scale bars: A, B = 100 µm, C = 10 µm.

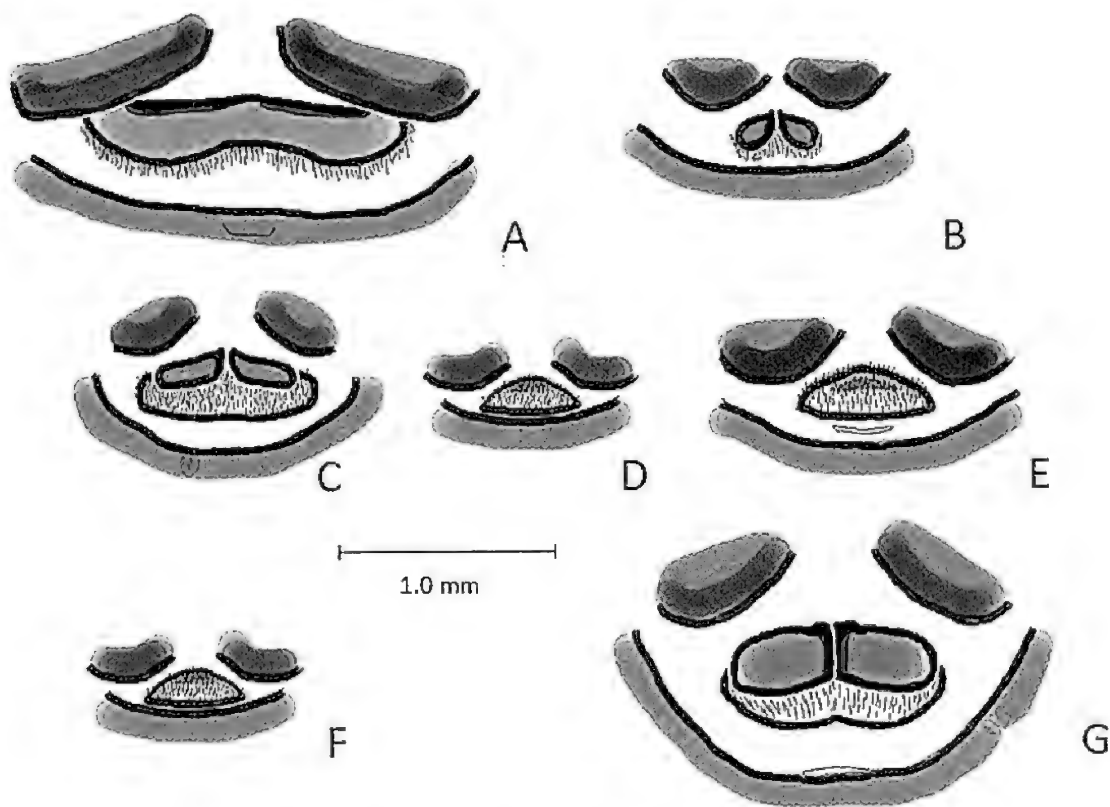


FIGURE 20. *Uduha* spp., females: cribellum or colulus, and base of anterior lateral spinnerets surrounded by soft, flexible cuticle, anterior to top. A. *U. halabe*, CASENT9017873 from Parc Nacional Ranomafana, entire cribellum. B. *U. ibonina*, CASENT9006035 from Parc Nacional Ranomafana, divided cribellum (note small size of spinning plates). C. *U. pseudoevanescens*, CASENT9006008 from Parc Nacional Périnet, divided cribellum. D. *U. evanescens* (Dahl, 1901), CASENT9024032 from Parc Nacional Ranomafana, colulus. E. *U. madagascariensis* (Vinson, 1863), CASENT9006028 from Forêt Analavelona, colulus. F. *U. goodmani*, holotype (CASENT9006074) from Réserve Naturelle Intégrale d'Andohahela, colulus. G. *U. schlingeri*, CASENT9006028 from Parc Nacional Ranomafana, divided cribellum (note large size of spinning plates at posterior margin of soft cuticle). Illustrations by Charles Griswold. Scale bar = 1.0 mm.



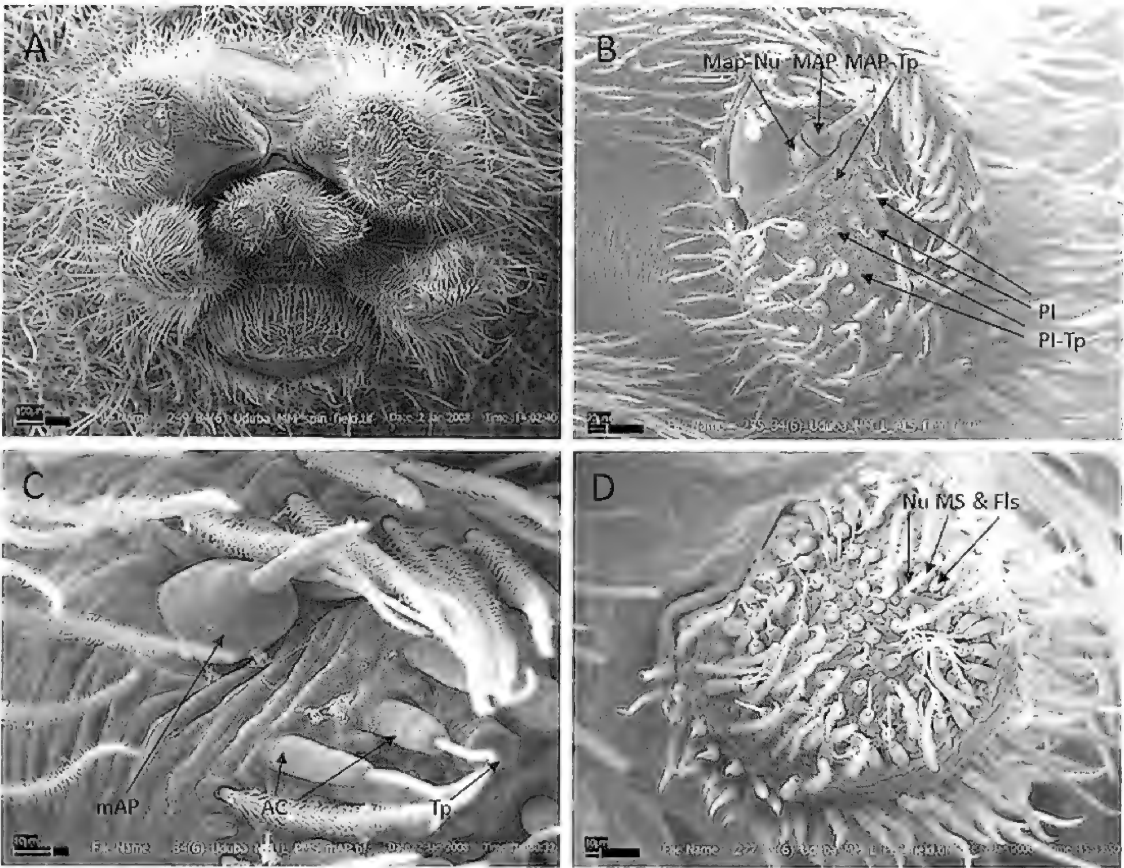


FIGURE 21. Spinning organs of *Uduba schlingeri*, male CASENT9006052 from Talatakely, Parc Nacional Ranomafana, scanning electron micrographs (SEM). A. Whole spinnerets. B. Left ALS, showing Nu of MAP. C. Apex of left PMS. D. Left PMS, showing Nu of MS and Fls triplet. AC, aciniform gland spigot(s); Fls, flankers of pseudoflagelliform gland spigot; MAP, major ampullate gland spigot(s); mAP, minor ampullate gland spigot(s); MS, modified spigot, or pseudoflagelliform gland spigot; Nu, nubbin; PI, piriform gland spigot(s); Tp, tartipore. Scale bars: A = 100  $\mu$ m, B = 20  $\mu$ m, C, D = 10  $\mu$ m.



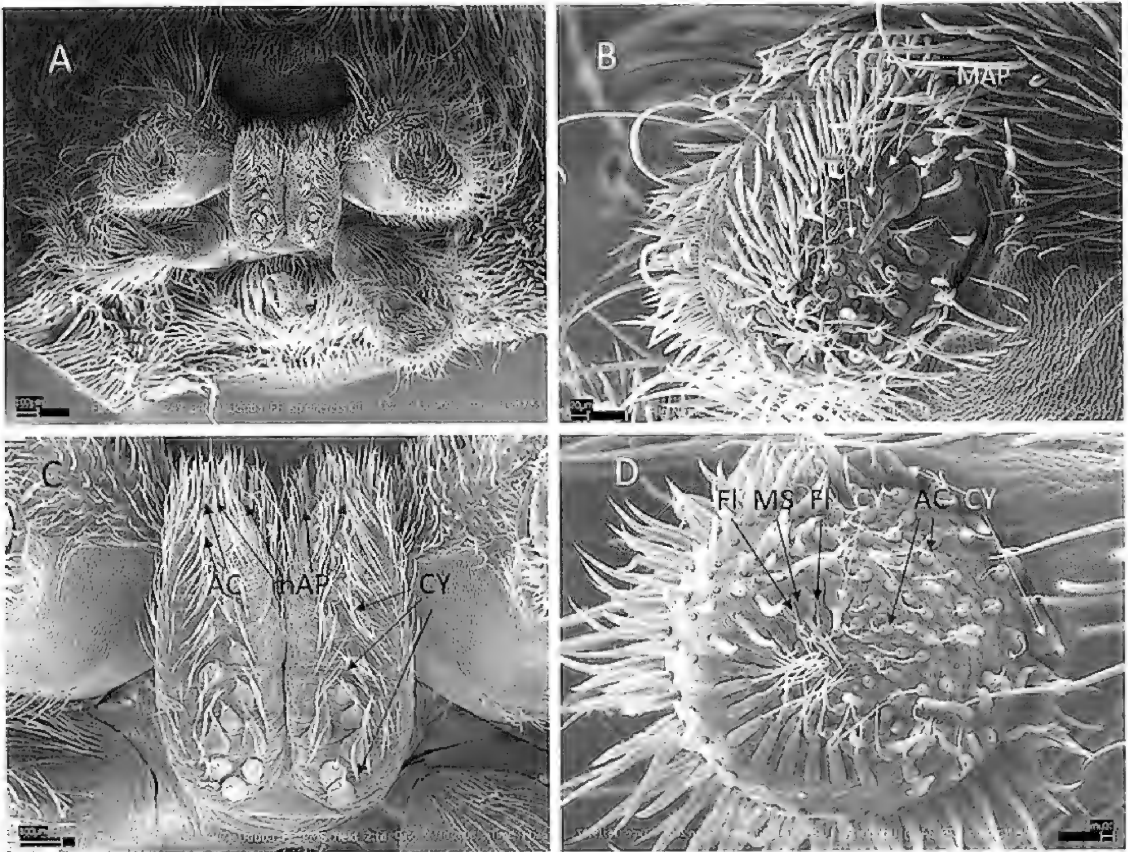


FIGURE 22. Spinning organs of *Uduha schlingeri*, female CAsENT9025468 from Vatoharanana, Parc Nacional Ranomafana, scanning electron micrographs (SEM). A. Whole spinnerets. B. Right ALS. C. PMS. D. Left PLS. AC, acini-form gland spigot(s); CY, cylindrical gland spigot(s); Fls, flankers of pseudoflagelliform gland spigot; MAP, major ampul-late gland spigot(s); mAP, minor ampullate gland spigot(s); MS, modified spigot, or pseudoflagelliform gland spigot; PI, piriform gland spigot(s); Tp, tartipore. Scale bars: A, C = 100  $\mu$ m, B = 20  $\mu$ m, D = 10  $\mu$ m.

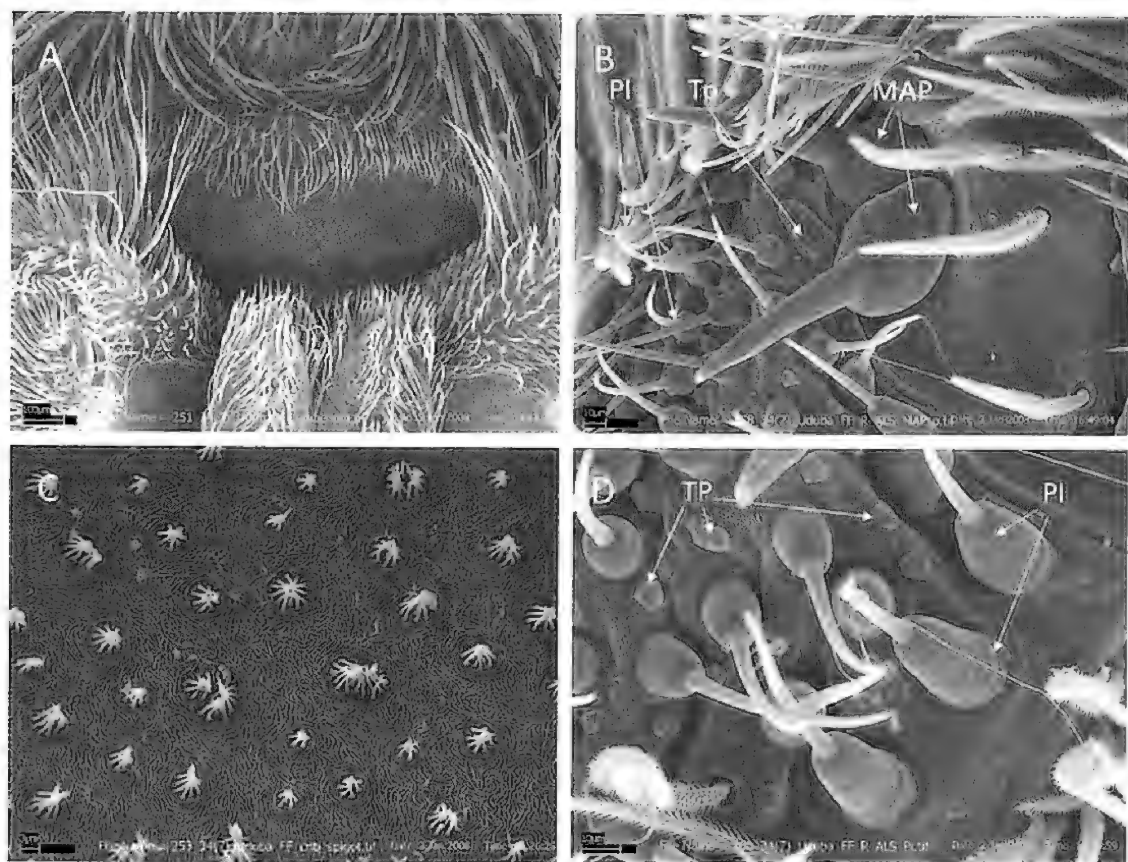


FIGURE 23. Details of spinning organs of *Uduba schlingeri*, female CASENT9025468 from Vatoharanana, Parc National Ranomafana, scanning electron micrographs (SEM). A. Cribellum and anterior of PMS. B. Right ALS, MAP and TP. C. Cribellum spinning field, close-up of cribellar spigot bundles. D. Right ALS, PI and TP. MAP, major ampullate gland spigot(s); PI, piriform gland spigot(s); TP, tartipore. Scale bars: A = 100  $\mu$ m, C = 3  $\mu$ m, B, D = 10  $\mu$ m.

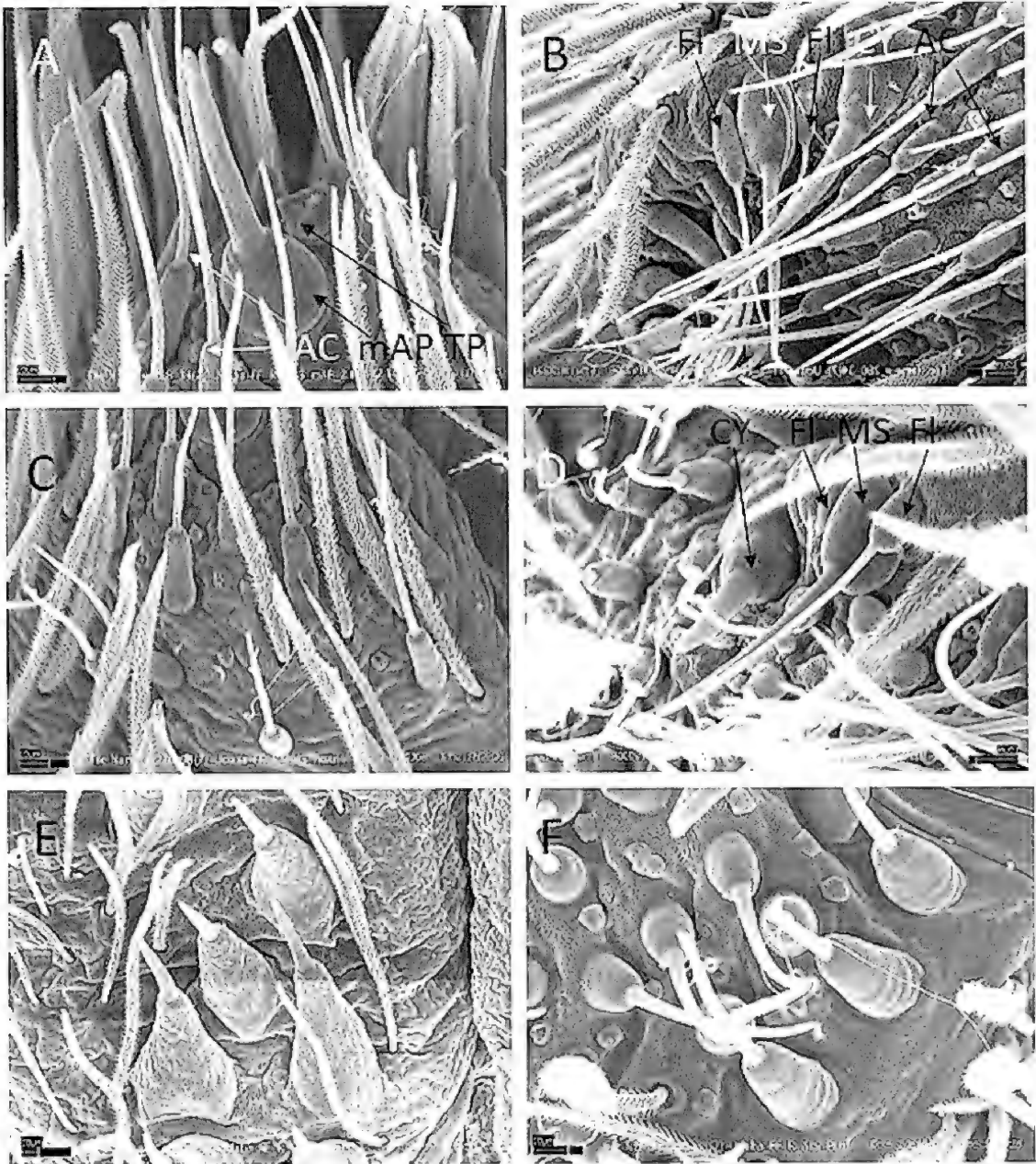


FIGURE 24. Details of spinning organs of *Uduba schlingeri*, female CASENT9025468 from Vatoharanana, Parc National Ranomafana, scanning electron micrographs (SEM). A. Right PMS apex, showing AC, mAP and TP. B. Left PLS (image flipped to appear as right), showing several AC, a CY and the triplet of MS and two MSFl. C. Right PMS, showing AC (not labelled). D. Left PLS (image flipped to appear as right), showing the triplet of MS and two MSFls, a CY and several AC (not labelled). E. Right PMS, posterolateral surface showing CY. F. Right ALS, showing PIs and TPs. AC, acini-form gland spigot(s); CY, cylindrical gland spigot(s); Fls, flanking spigot(s) of modified spigot; mAP, minor ampullate gland spigot(s); MS, modified spigot, or pseudoflagelliform gland spigot; TP, tartipore. Scale bars: A–F = 10  $\mu$ m.

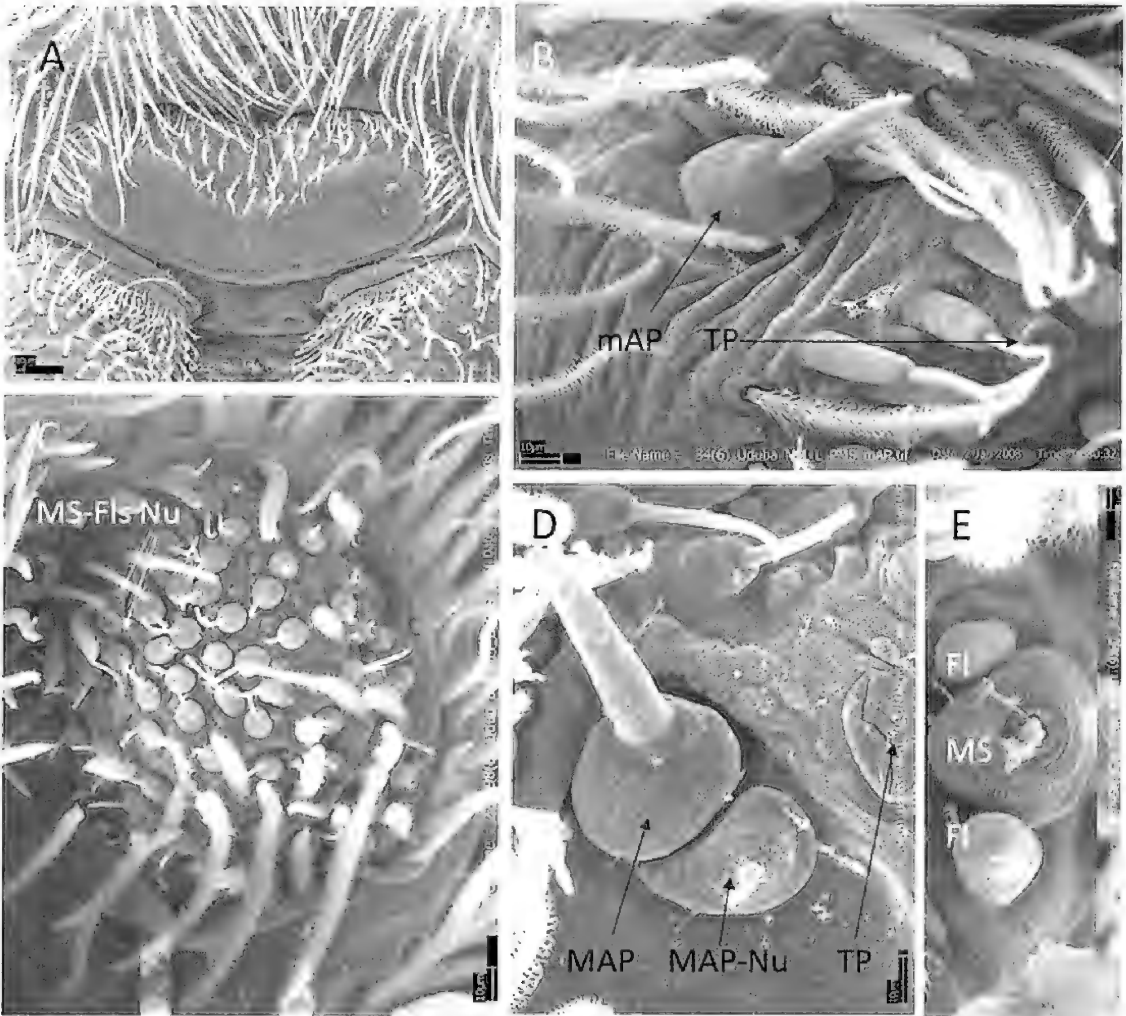


FIGURE 25. Details of spinning organs of male *Uduba* spp., scanning electron micrographs (SEM). A, *U. fisheri* (CASENT9026389) from Anjozorobe. B, D, E. *U. schlingeri*. (CASENT9006052) from Talatakely, Parc National Ranomafana. A. Cribellum, lacking spigots. B. Left PMS showing mAP and TP. C. Left PLS showing nubbins (Nu) that remain from MS-MSFls triplet. D. Left ALS, showing MAP, TP, and MAP Nu. E. Left PLS showing nubbins (Fl) that remain from MS-MSFl triplet. Fls, nubbins of flankers of pseudoflagelliform gland spigot; MAP, major ampullate gland spigot(s); MAP-Nu, major ampullate gland spigot nubbin; mAP, minor ampullate gland spigot(s); MS, nubbin of modified spigot, or pseudoflagelliform gland spigot; TP, tartipore. Scale bars: A–D = 10  $\mu$ m, E = 2  $\mu$ m.

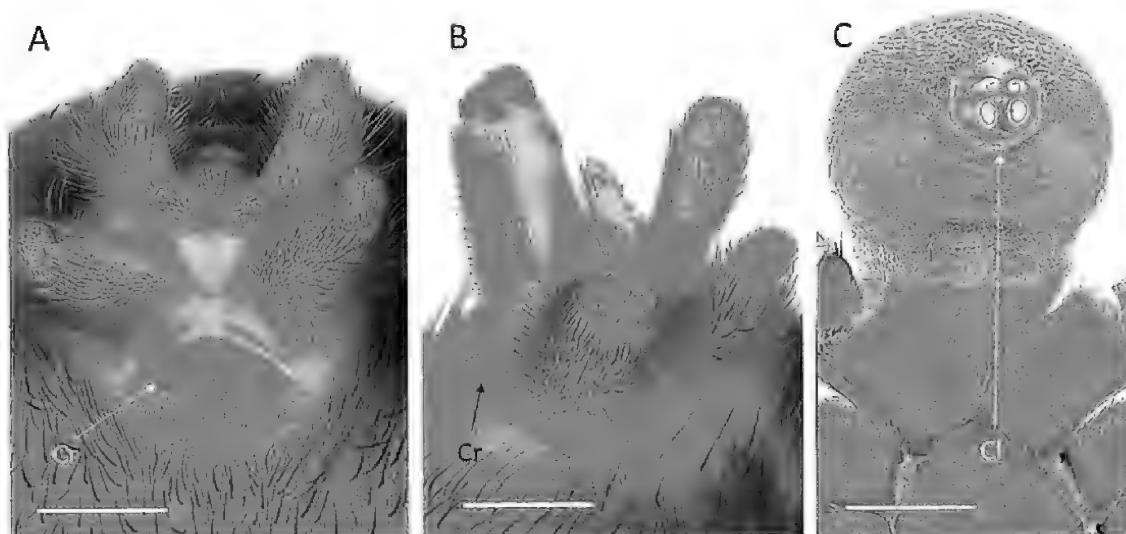


FIGURE 26. Spinning organs of *Uduba* spp. A. B. *U. schlingeri* ♀, (CASENT9006075), Vatoharanana, Parc National Ranomafana. C. *U. lamba* ♂, *holotype*, (CASENT9042542), R.N.I. Betampona. Cl, colulus, Cr, cribellum. Scale bars: A, B = 0.5 mm, C = 2.0 mm.

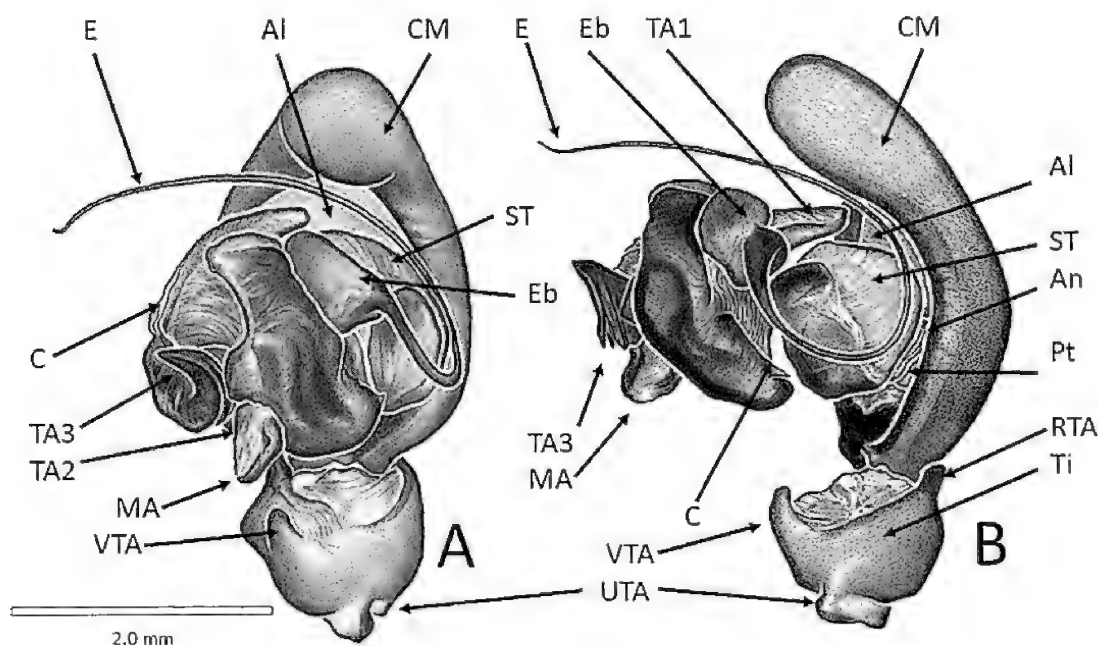
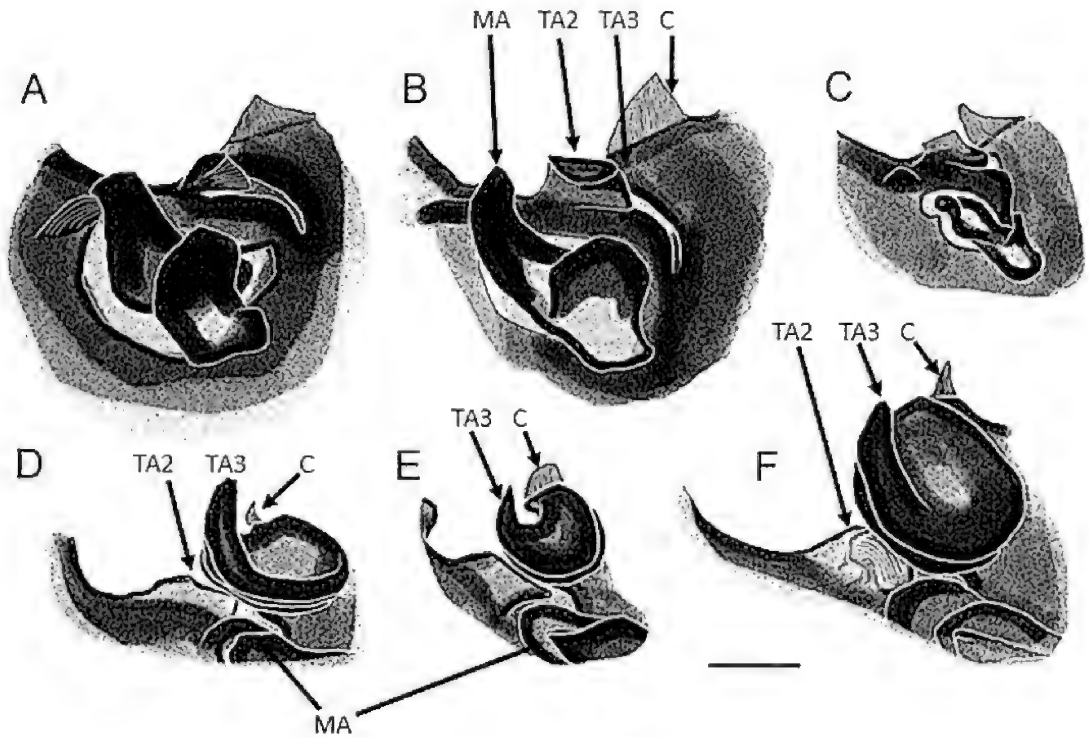


FIGURE 27. *Uduba hatahe*, new species, paratype (CASENT9006017), Parc National Ranomafana, expanded right male palpus, tibia and tarsus. A. Ventral. B. Retrolateral. Al, alveolus of palpal tarsus; An, anneli of subtegulum; C, conductor; CM, cymbium; E, embolus; Eb, embolic base; MA, median apophysis; Pt, petiole of subtegulum; RTA, retrolateral tibial apophysis of male palp, typically arising apically; ST, subtegulum; TA1, proapical apophysis of the tegulum; TA2, proapical apophysis of the tegulum, arising just prolaterad of distal notch; TA3, retroapical apophysis of the tegulum, typically with apex extending to prolateral; Ti, tibia; UTA, basal tibial apophysis on male palp, which is located at proximoventral margin of tibia extending above patellar intersegmental membrane; VTA, ventral tibial apophysis on male palp, typically arising at midsegment. Illustrations by Jenny Speckels. Scale bar = 2.0 mm.





scale bar = 0.2mm (A-C); 0.5mm (D-F)

FIGURE 28. *Uduba* spp., left male palpal bulbs, apical views. A. *U. hiragasy*, holotype (CASENT9065679) from Tsinjoarivo Forest. B. *U. valiha*, paratype (CASENT9082181) from Forêt de Vevembe. C. *U. fisheri*, paratype (CASENT9026388) from Anjozorobe. D. *U. halabe*, (CASENT9042520) from Parc National Ranomafana. E. *U. platnicki*, holotype (CASENT9006021) from Marojejy Reserve. F. *U. kavanaughi*, paratype (CASENT9031127) from Talatakeley. Parc National Ranomafana. C, conductor; MA, median apophysis; TA2, proapical apophysis of the tegulum, arising just prolaterad of distal notch; TA3, retroapical apophysis of the tegulum, typically with apex extending to prolateral. Scale bar = 0.2 mm (A-C); 0.5 mm (D-F). Illustrations by Charles Griswold.



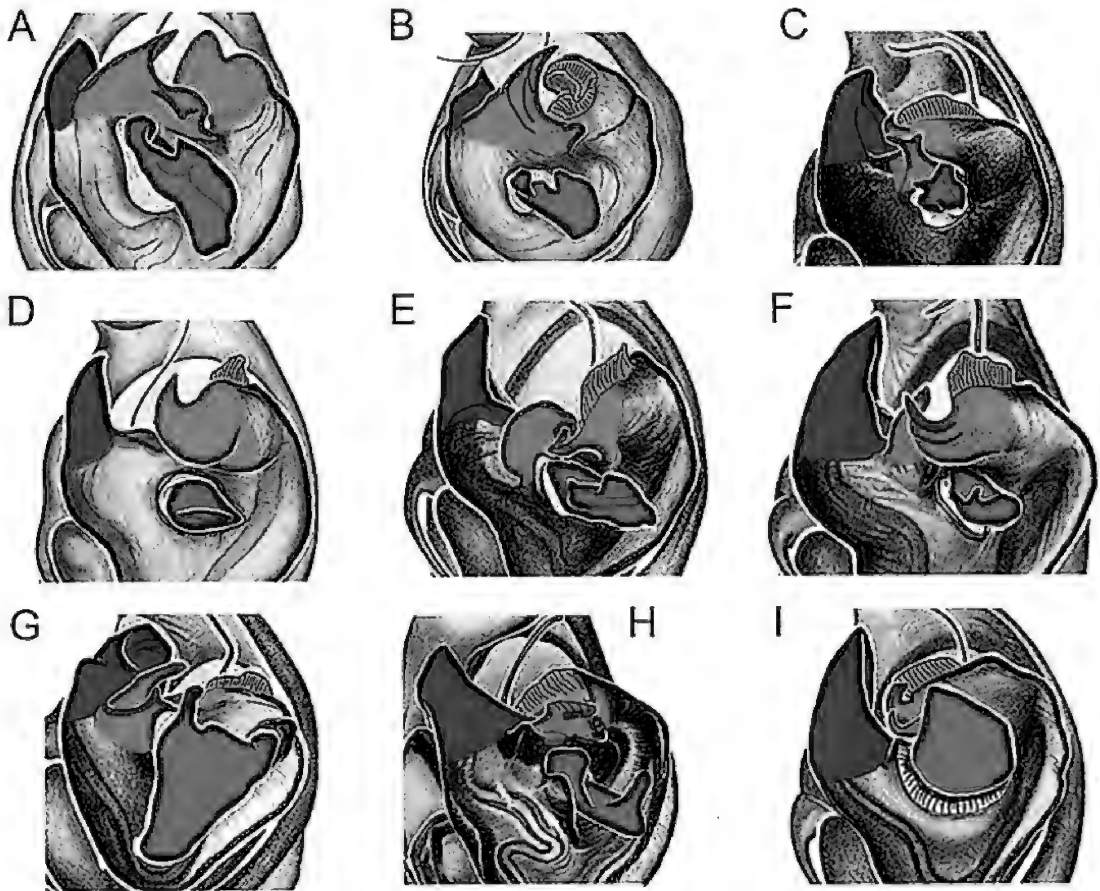


FIGURE 29. *Uduba* spp., color-coded comparisons of male left palpal tarsi, ventral views. A. *U. evanescens* (Dahl, 1901) (CASENT9024032) from Parc National Ranomafana. B. *U. rakotofrah*, paratype (CASENT9062794), from Anosyenne Mts. C. *U. madagascariensis* (Vinson, 1863) (CASENT9006026) from Ambohimanga. D. *U. halabe*, holotype (CASENT9006018) from Parc National Ranomafana. E. *U. schlingeri*, (CASENT9006062) from Parc National Ranomafana. F. *U. ibonia*, (CASENT9006036) from Parc National Ranomafana. G. *U. rakotozafy*, holotype (CASENT9006024) from Parc National Périnet. H. *U. fisheri*, (CASENT9007941) from Anjozorobe. I. *U. rinha*, (MRAC174.445) from 25 km W Morarano Chrome, Toamasina Province. Conductor (C), yellow; Median apophysis (MA), blue; TA1, purple; TA2, green; TA3, red. Illustrations by Charles Griswold and Jenny Speckels, not to scale.

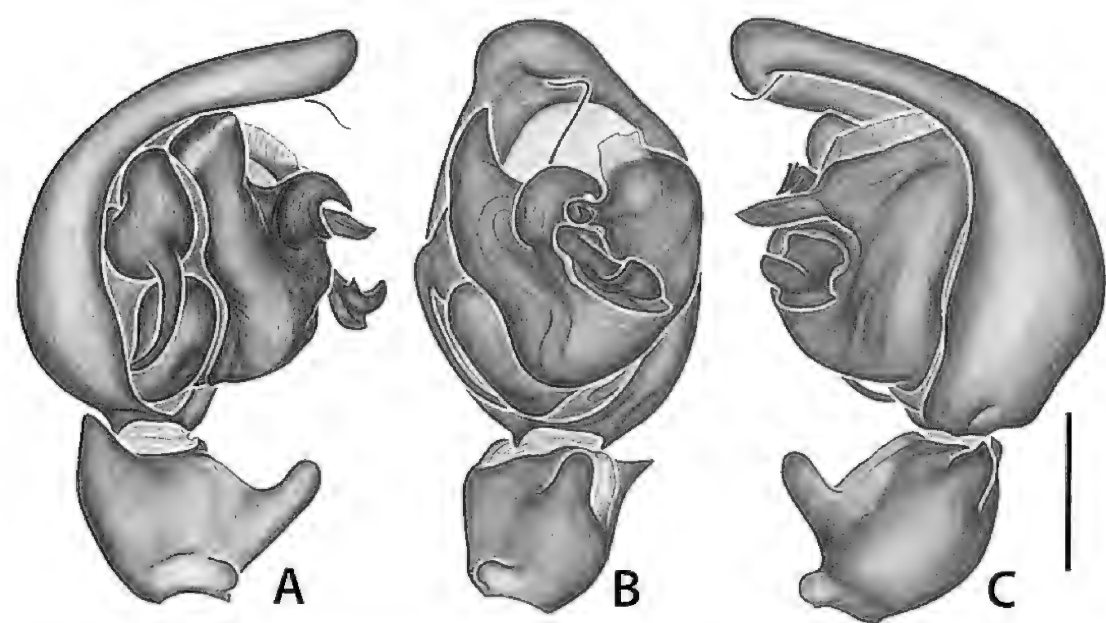


FIGURE 30. *Uduba andriamihajai*, new species, Holotype (CASENT9010142), Korikory, left male palpus. A. Prolateral. B. Ventral. C. Retrolateral. Illustrations by Daniele Polotow. Scale bar = 1.0 mm.

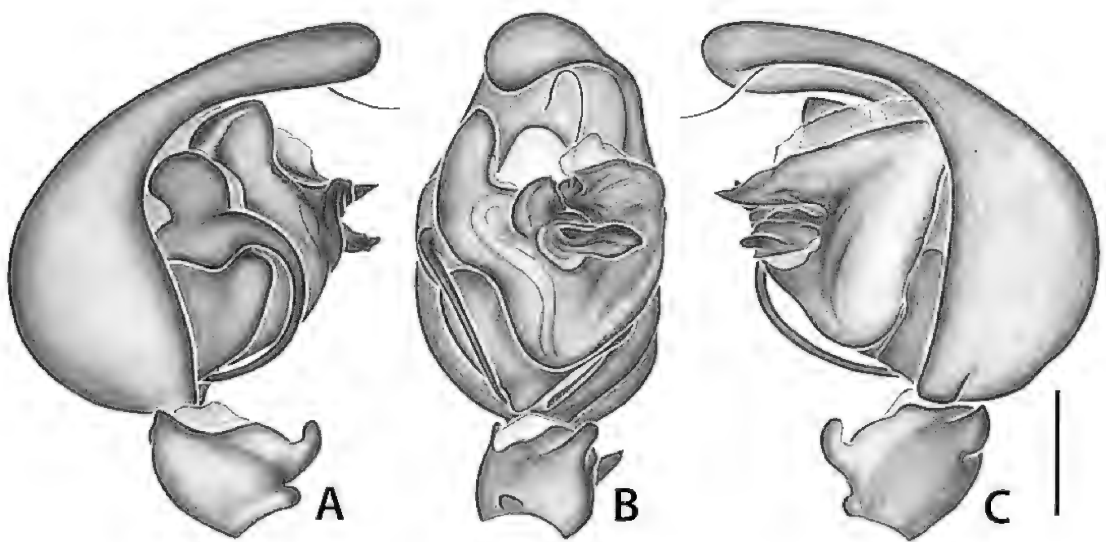


FIGURE 31. *Uduba balsama*, new species, Holotype (CASENT9030929), left male palpus. A. Prolateral. B. Ventral. C. Retrolateral. Illustrations by Daniele Polotow. Scale bar = 1.0 mm.

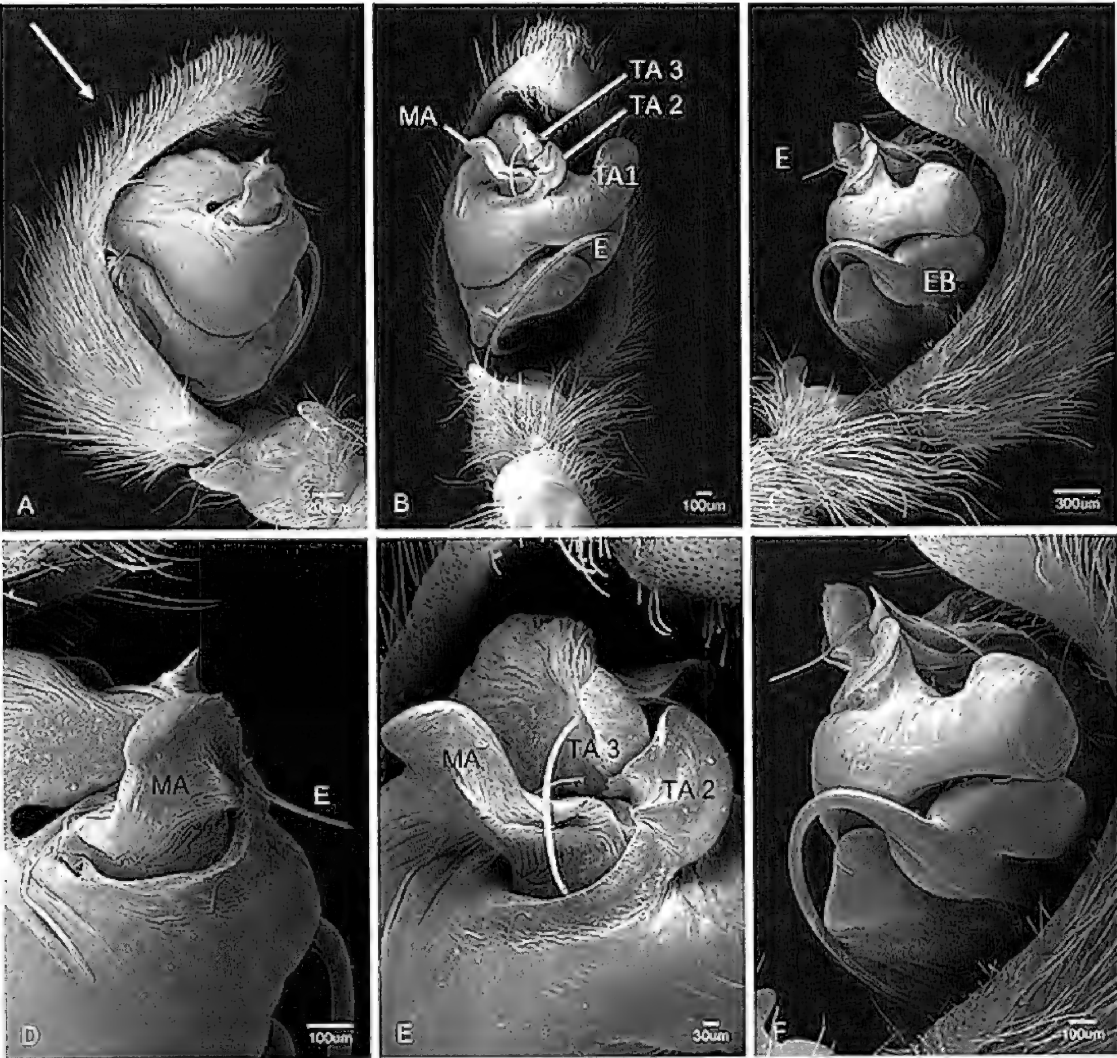


FIGURE 32. *Uduba balsama*, new species, (CASENT9000543), Kirindy, right male palpus, SEM. A. Tibia and tarsus, retrolateral; arrow to cymbial scopula. B. Tibia and tarsus, ventral. C. Tibia and tarsus, prolateral: note how embolus arises retrobasally, disappears behind cymbium, and apex appears distally from behind tegulum; arrow to cymbial scopula. D. Bulb, retrolateral. E. Bulb, retroventral: note how embolus apex extends from behind tegulum. F. Bulb, prolateral: note concave apical margin of TA3. C, conductor; Cm, cymbium; E, embolus; EB, embolic base; MA, median apophysis; ST, subtegulum; T, tegulum; TA1, proapical apophysis of the tegulum; TA2, proapical apophysis of the tegulum, arising just prolaterad of distal notch; TA3, retroapical apophysis of the tegulum, typically with apex extending to prolateral. Scale bars A = 200  $\mu$ m, B, D, F = 100  $\mu$ m, C = 300  $\mu$ m, E = 30  $\mu$ m.

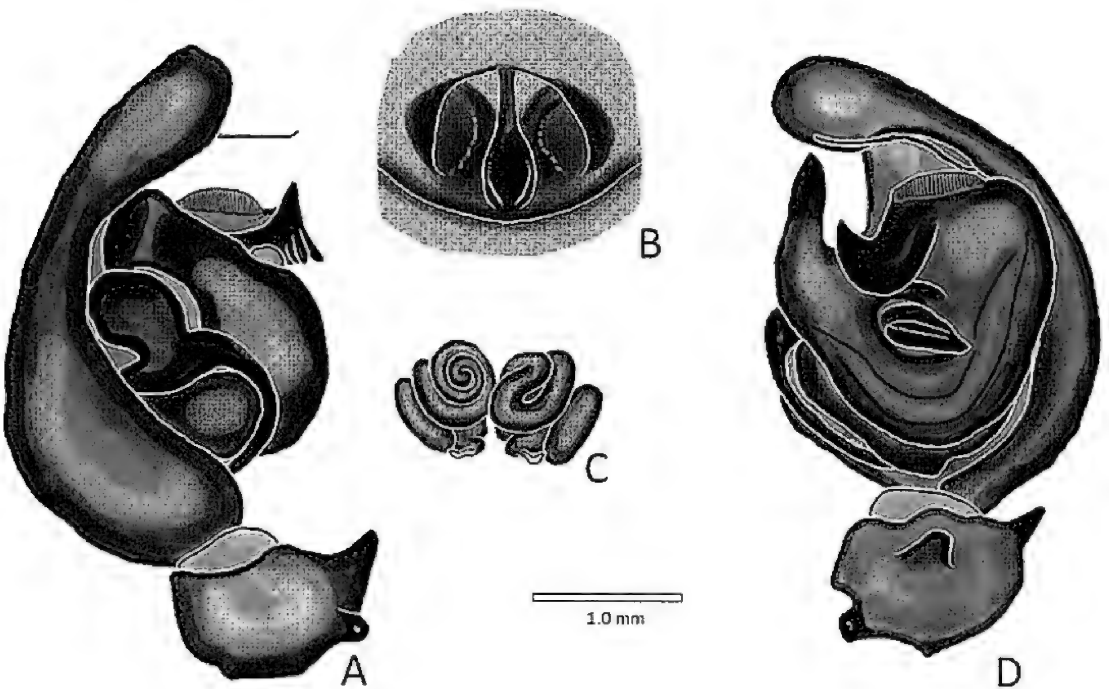


FIGURE 33. *Uduba dahlí* Simon, 1903, genitalia. A, D. Left male palpus, prolateral and ventral, *Marussencia madagascariensis* (Dahl, 1901), paralectotype male, ZMB25277a. B, C. Female genitalia, *Marussencia madagascariensis* (Dahl, 1901), lectotype female, ZMB25277a. A. Prolateral. B. Epigynum, ventral. C. Vulva, dorsal. D. Ventral. Illustrations by Charles Griswold. Scale bar = 1.0 mm.

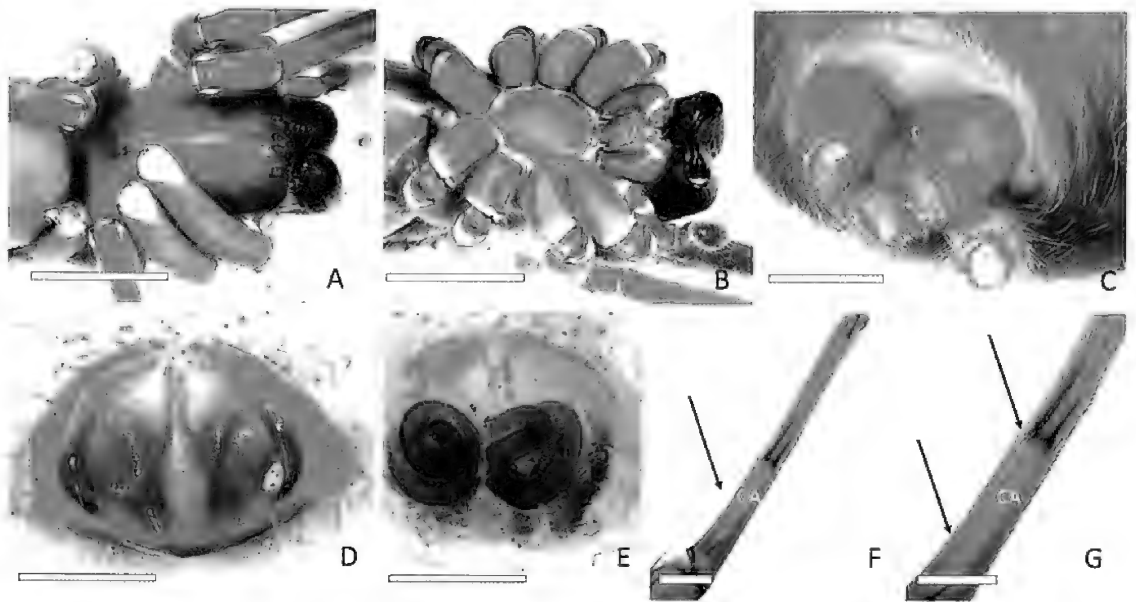


FIGURE 34. Syntype ZMB25276a of *Marussencia-madagascariensis* Dahl 1901 (= lectotype ♀ *Uduba dahlí* (Simon 1903)). A. Carapace, dorsal. B. Prosoma ventral. C. Spinning organs including divided cribellum. D. Epigynum, ventral. E. Vulva, dorsal. F. Left metatarsus IV, retrodorsal, arrow to calamistrum. G. Calamistrum, left metatarsus IV, retrodorsal, arrows to beginning and end of calamistrum. CA, calamistrum. Scale bars: A, B = 5.0 mm, C, D, E = 1.0 mm, F = 2.0 mm, G = 1.0 mm.

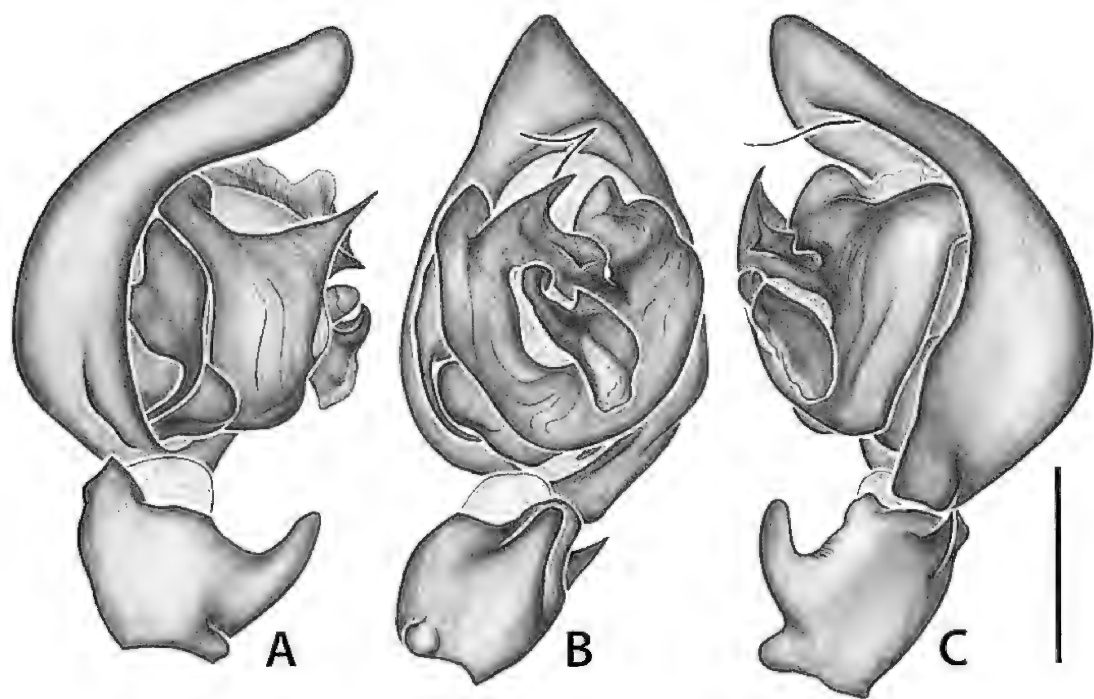


FIGURE 35. *Uduba evanescens* (Dahl, 1901), (CASENT9006087) from Parc National Ranomafana, left male palpus. A. Prolateral. B. Ventral. C. Retrolateral. Illustrations by Daniele Polotow. Scale bar = 1.0 mm.

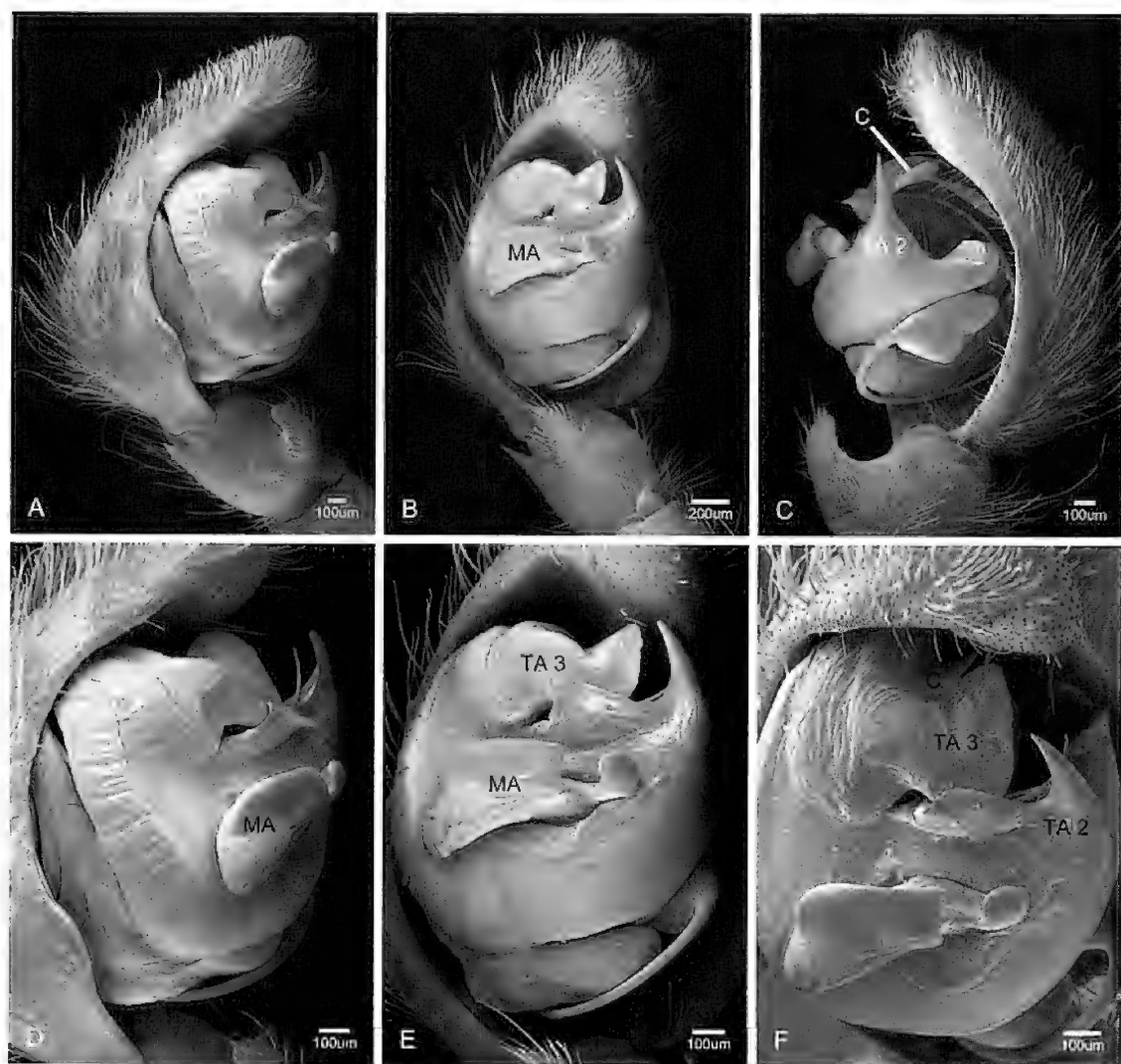


FIGURE 36. *Uduba evanescens* (Dahl, 1901), (CASENT9006087), from Ranomafana, right male palpus, SEM. A. Tibia and tarsus, retrolateral. B. Tibia and tarsus, ventral. C. Tibia and tarsus, prolateral. D. Bulb, retrolateral. E. Bulb, ventral. F. Bulb and cymbium, apical. C, conductor; MA, median apophysis; TA2, proapical apophysis of the tegulum, arising just prolaterad of distal notch; TA3, retroapical apophysis of the tegulum, typically with apex extending to prolateral. Scale bars: A, C–F = 100 µm, B = 200 µm.



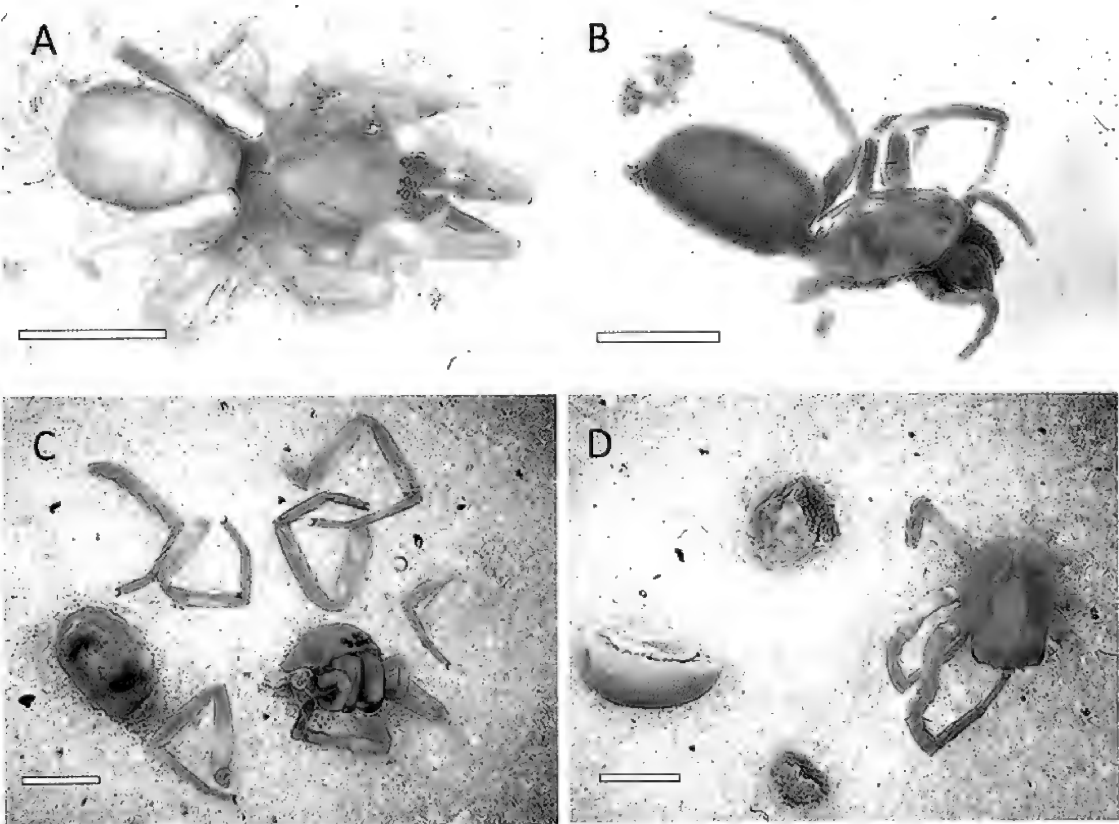


FIGURE 37. Alcohol preserved syntypes of *Calamistrula evanescens* Dahl 1901 (= *Uduba evanescens* (Dahl, 1901)). A. ZMB30811, juvenile, dorsal. B. ZMB30808, juvenile, lateral. C. ZMB30813, juvenile, fragments. D. ZMB30812, juvenile, fragments. Scale bars = 5.0 mm.

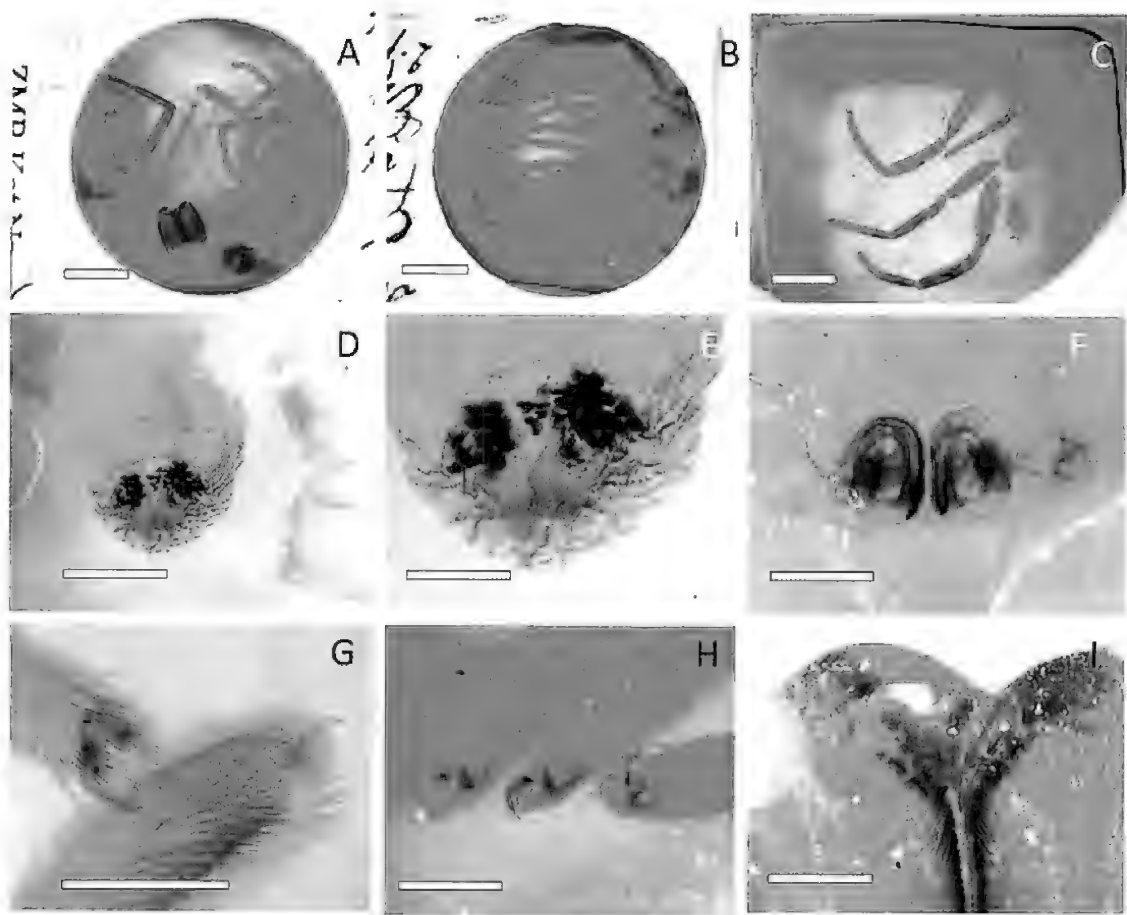


FIGURE 38. Slide mounted syntypes of *Calamistrula evanescens* Dahl 1901 (= *Uduba evanescens* (Dahl, 1901)). B, D, E, F. Lectotype female, ZMB30810. A, C, G–I. Syntype. A. ZMB30809, legs and mouthparts. B. ZMB30810, legs. C. ZMB30808a, legs and endites. D. ZMB30811a, abdomen. E. ZMB30811a, abdomen with spinnerets. F. ZMB30811a, ♀ genitalia. G. ZMB30809, palpal tarsus and leg tarsus. H. ZMB30810, leg tarsi. I. ZMB30809, chelicerae. Scale bars: A–C = 5.0 mm, D = 1.0 mm, E, F = 0.5 mm, G–I = 0.25 mm.

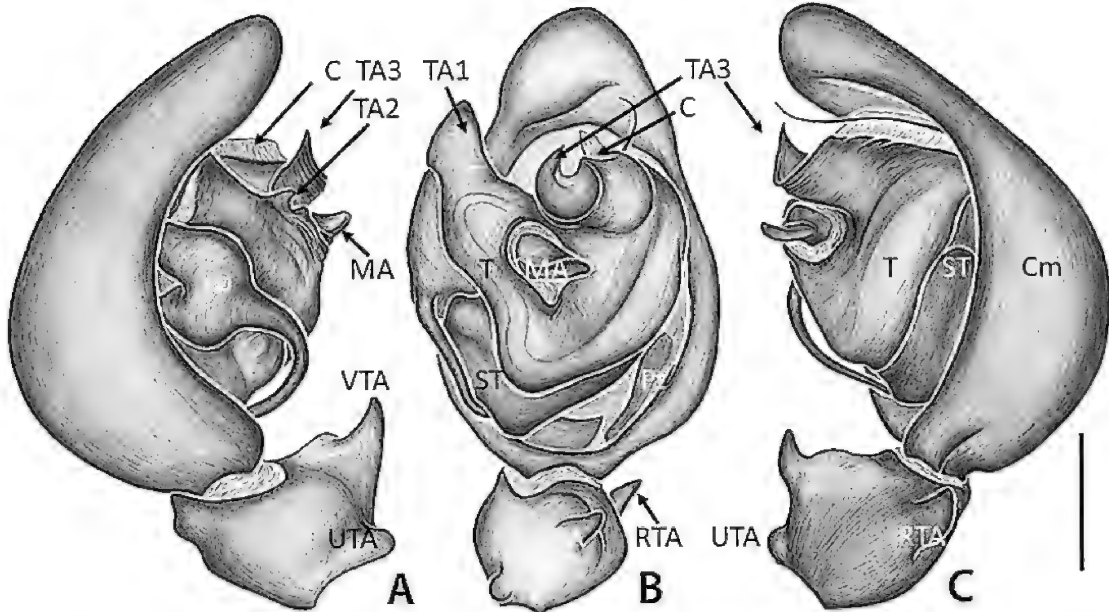


FIGURE 39. *Uduba fandroana*, new species, Holotype (CASENT9002691) from Anjozorobe, left male palpus. A. Prolateral. B. Ventral. C. Retrolateral. Illustrations by Daniele Polotow. C, conductor; Cm, cymbium; Eb, embolar base; MA, median apophysis; Pt, petiole of subtegulum; RTA, retrolateral tibial apophysis on male palp; ST, subtegulum; T, tegulum; TA1, proapical apophysis of the tegulum; TA2, proapical apophysis of the tegulum, arising just prolaterad of distal notch; TA3, retroapical apophysis of the tegulum; UTA, basal tibial apophysis on male palp, which is located at proximoventral margin of tibia extending above patellar intersegmental membrane; VTA, ventral tibial apophysis on male palp, typically arising at midsegment. Scale bar = 1.0 mm.

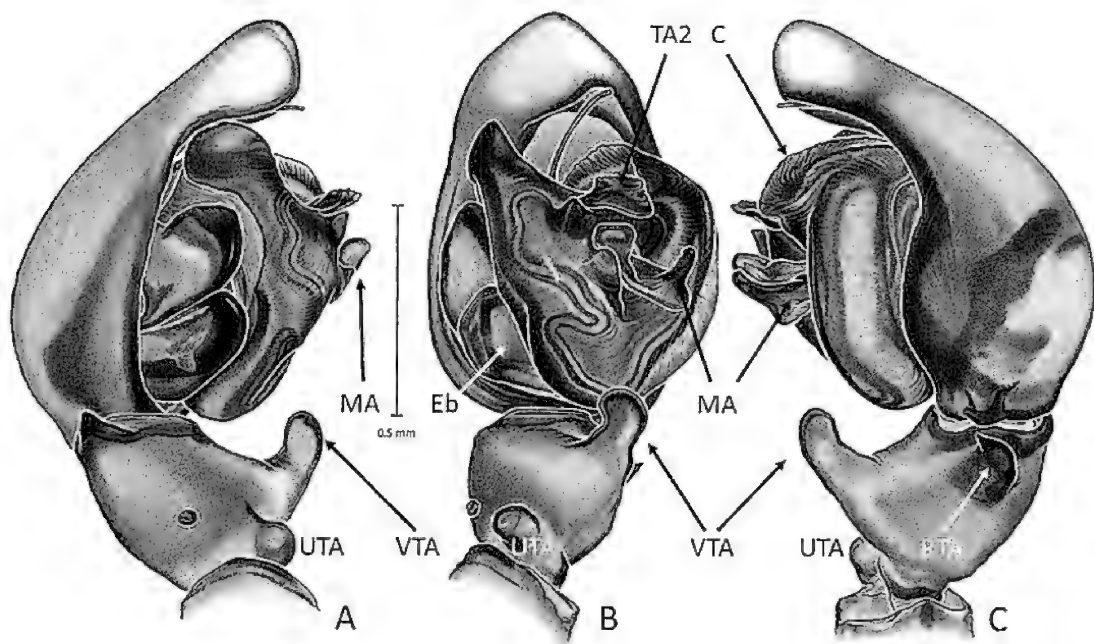


FIGURE 40. *Uduba fisheri*, new species, (CASENT9007941), Anjozorobe, left male palpus. A. Prolateral. B. Ventral. C. Retrolateral. Illustrations by Giovanni Maki. C, conductor; Eb, embolic base; MA, median apophysis; RTA, retrolateral tibial apophysis on male palp, typically arising apically; TA2, proapical apophysis of the tegulum, arising just prolaterad of distal notch; UTA, basal tibial apophysis on male palp, which is located at proximoventral margin of tibia extending above patellar intersegmental membrane; VTA, ventral tibial apophysis on male palp, typically arising at midsegment. Scale bar = 0.5 mm.

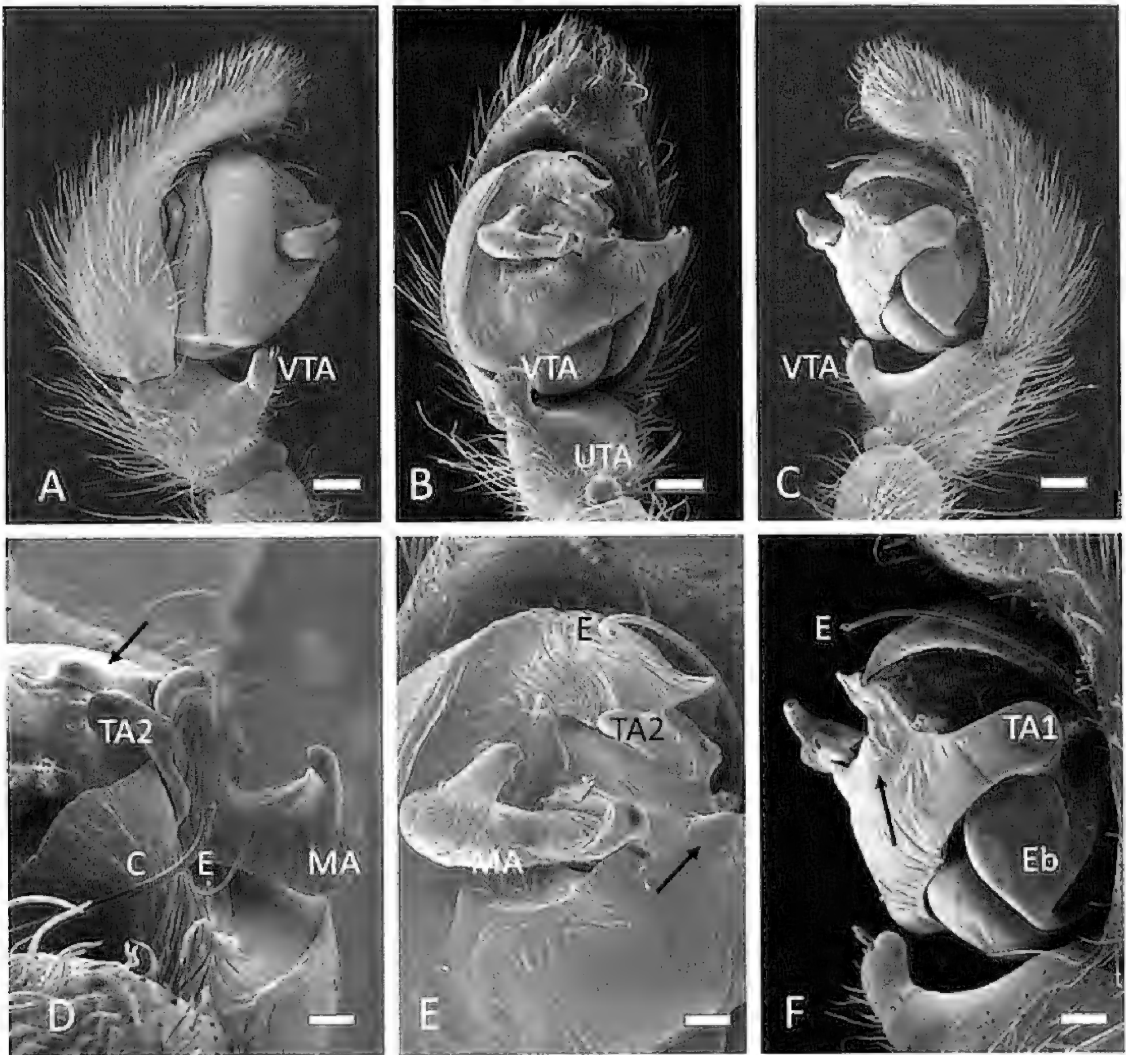


FIGURE 41. *Uduba fisheri* (CASENT9026389), from 3 km 41°NE Andranomay near Anjozorobe, right male palpus, SEM. A. Tibia and tarsus, retrolateral. B. Tibia and tarsus, ventral. C. Tibia and tarsus, prolateral. D. Bulb, retrolateral. E. Bulb, ventral. F. Bulb, prolateral. C, conductor; E, embolus; Eb, embolic base; MA, median apophysis; TA1, proapical apophysis of the tegulum; TA2, proapical apophysis of the tegulum, arising just prolaterad of distal notch; UTA, basal tibial apophysis on male palp; VTA, ventral tibial apophysis. Arrows to bump on tegulum. Scale bars A–C = 100  $\mu$ m, D = 40  $\mu$ m, E = 50  $\mu$ m, F = 60  $\mu$ m.

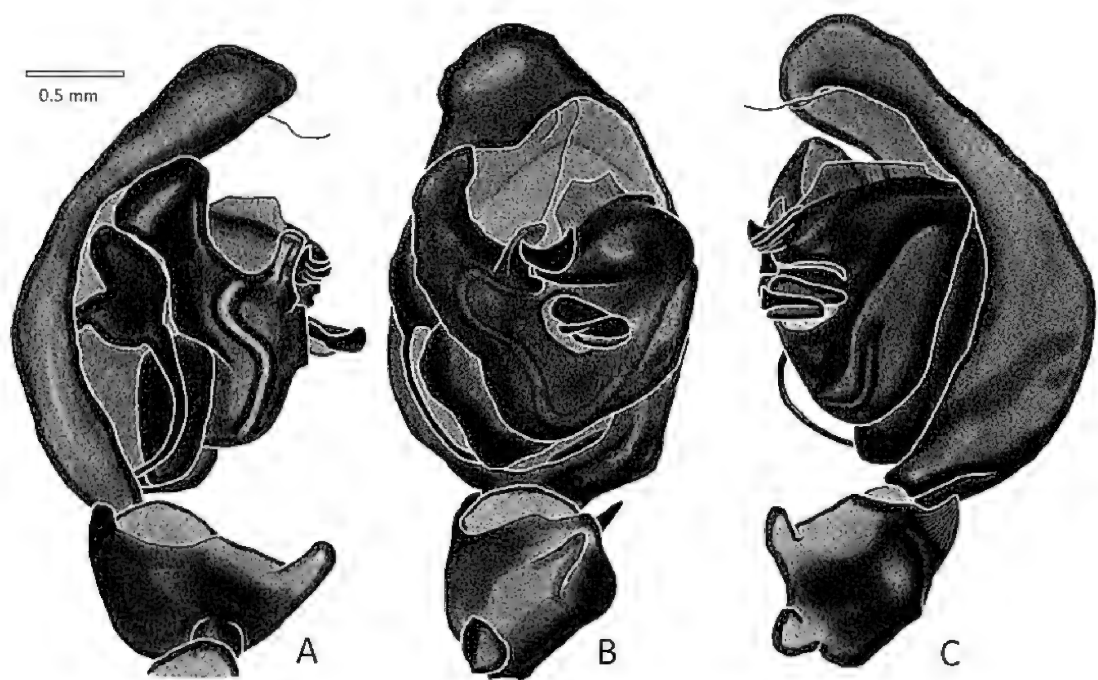


FIGURE 42. *Uduba hainteny*, new species, Holotype (CASENT9032857) from Forêt Ivoihibe, left male palpus. A. Prolateral. B. Ventral. C. Retrolateral. Illustrations by Charles Griswold. Scale bar = 0.5 mm.

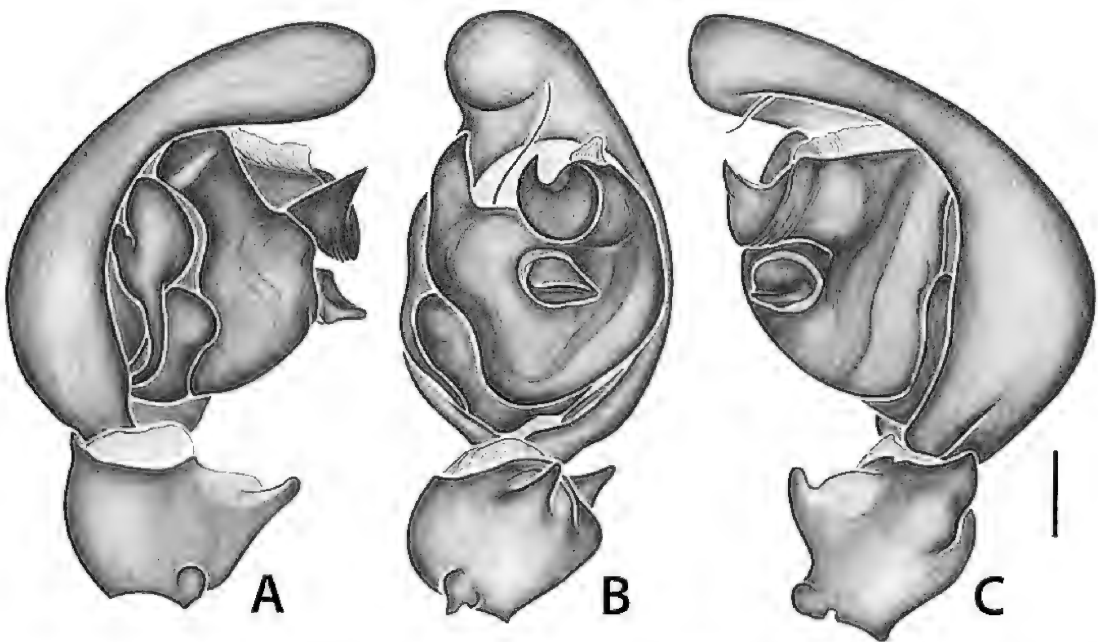


FIGURE 43. *Uduba hatahe*, new species, Holotype (CASENT9006018) from Parc National Ranomafana, left male palpus. A. Prolateral. B. Ventral. C. Retrolateral. Illustrations by Daniele Polotow. Scale bar 1.0 mm.



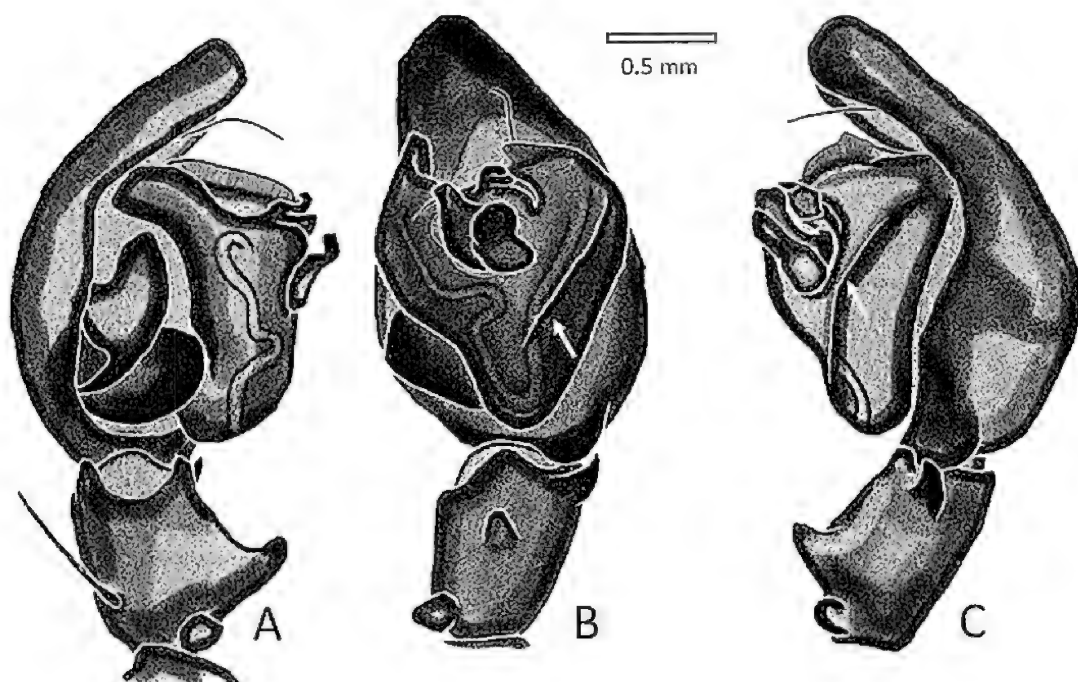


FIGURE 44. *Uduba hiragasy*, new species, paratype (CASENT9065698) from Tsinjoarivo Forest, left male palpus. A. Prolateral. B. Ventral. C. Retrolateral. Illustrations by Charles Griswold. Arrow to tegular ridge. Scale bar = 0.5 mm.

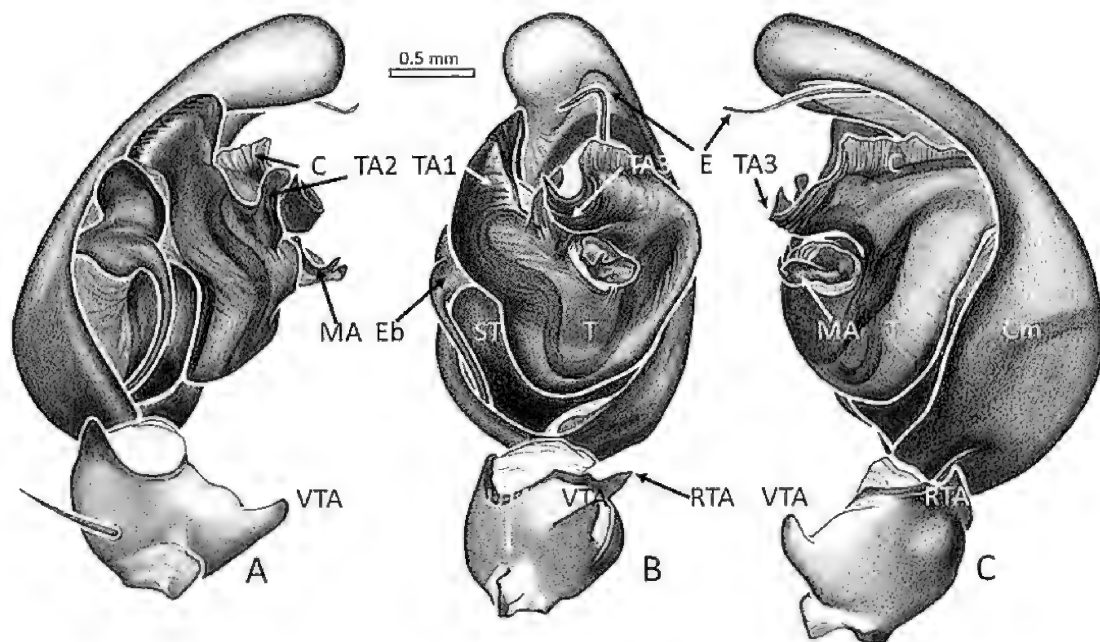


FIGURE 45. *Uduba ibouia*, new species, (CASENT9006036), from Parc National Ranomafana, left male palpus. A. Prolateral. B. Ventral. C. Retrolateral. Illustrations by Jenny Speckels. C, conductor; Cm, cymbium; E, embolus; Eb, embolic base; MA, median apophysis; RTA, retrolateral tibial apophysis on male palp, typically arising apically; ST, subtegulum; T, tegulum; TA1, proapical apophysis of the tegulum; TA2, proapical apophysis of the tegulum; TA3, retroapical apophysis of the tegulum; UTA, basal tibial apophysis on male palp; VTA, ventral tibial apophysis on male palp. Scale bar = 0.5 mm.

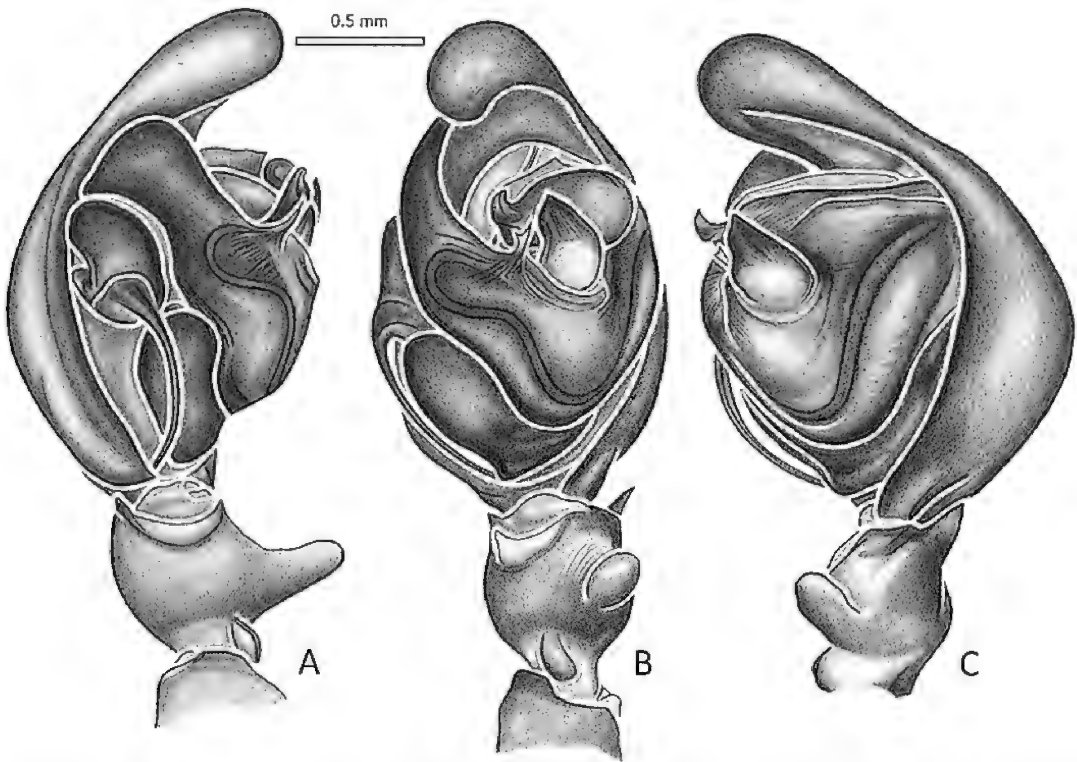


FIGURE 46. *Uduba irwini*, new species, (CASENT9065405) from ANJA Reserve, left male palpus. A. Prolateral. B. Ventral. C. Retrolateral. Illustrations by Rachel Diaz-Bastin. Scale bar = 0.5 mm.

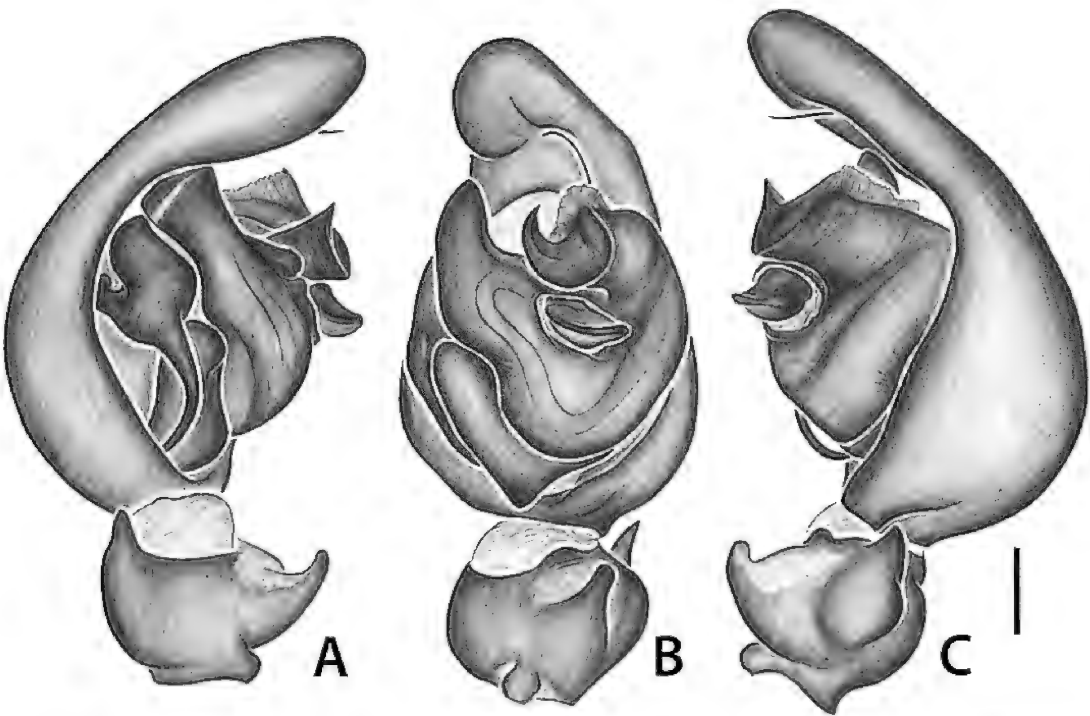


FIGURE 47. *Uduba kavanaughi*, new species, Holotype (CASENT9029870) from Parc National Ranomafana, left male palpus. A. Prolateral. B. Ventral. C. Retrolateral. Illustrations by Daniele Polotow. Scale bar = 1.0 mm.

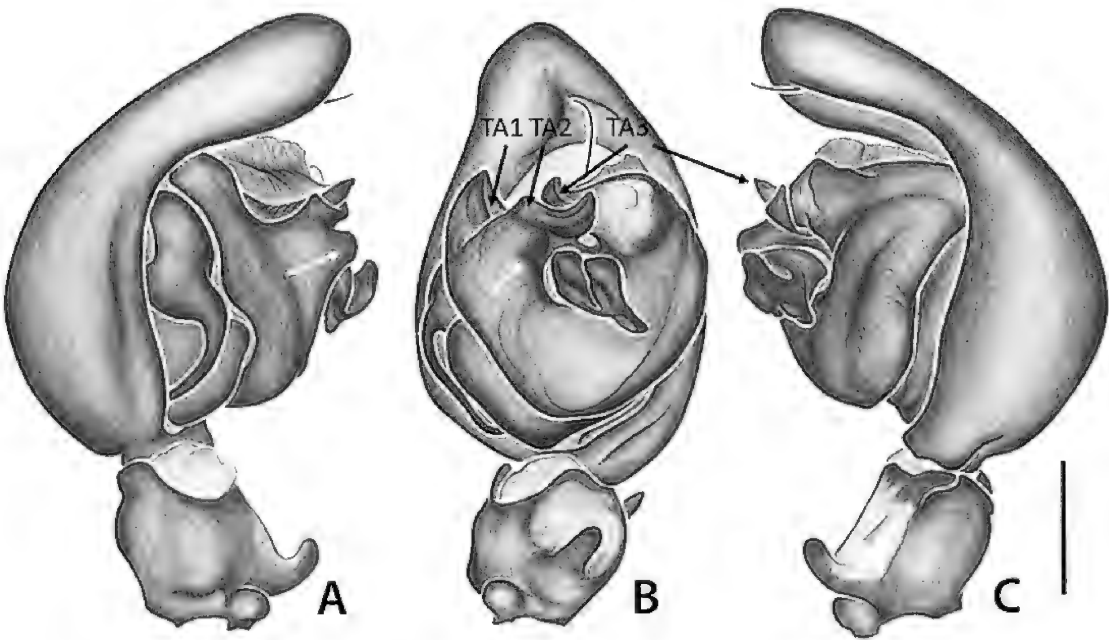


FIGURE 48. *Uduba lakroa*, new species, paratype (CASENT9062275), from Mt. Papango in Parc National de Midousy, left male palpus. A. Prolateral. B. Ventral. C. Retrolateral. White arrow (in figs. A, B) points to bump on tegulum. Illustrations by Daniele Polotow. TA1, proapical apophysis of the tegulum; TA2, proapical apophysis of the tegulum; TA3, retroapical apophysis of the tegulum. Scale bar = 1.0 mm.

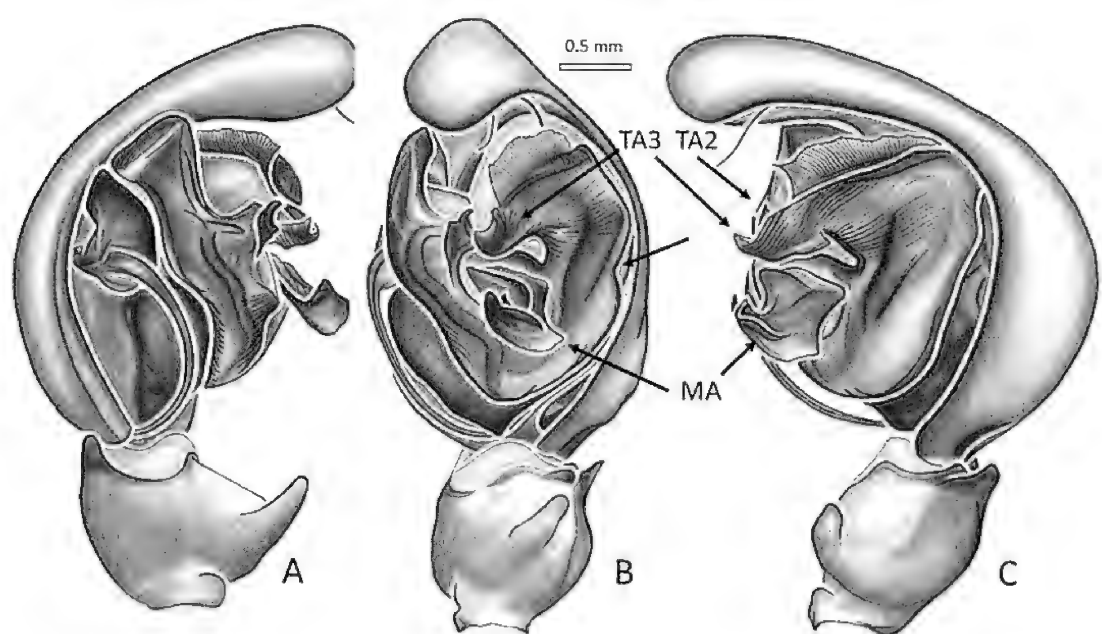


FIGURE 49. *Uduba lamba*, new species. Holotype (CASENT9052542) from Réserve National Intégrale Betampona, left male palpus. A. Prolateral. B. Ventral. C. Retrolateral. Arrow to retrolateral notch in tegulum. Arrow to bump on tegulum. Illustrations by Rachel Diaz-Bastin. MA, median apophysis; TA2, proapical apophysis of the tegulum; TA3, retroapical apophysis of the tegulum. Scale bar = 0.5 mm.

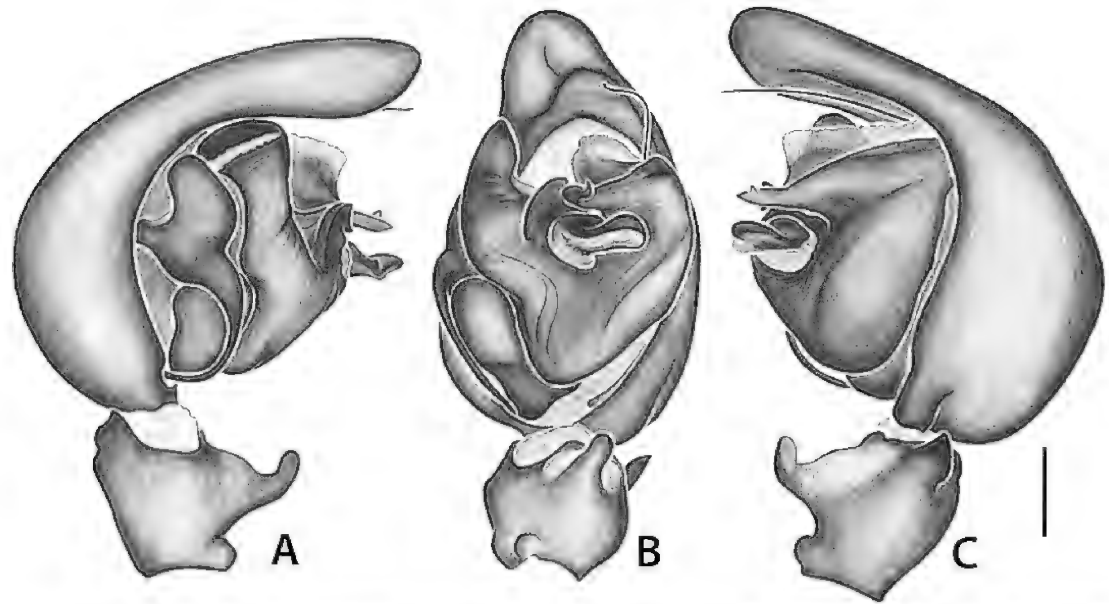


FIGURE 50. *Uduba lehibekokoa*, new species. Holotype (CASENT9017929) from Parc National de Namoroka, left male palpus. A. Prolateral. B. Ventral. C. Retrolateral. Illustrations by Daniele Polotow. Scale bar = 1.0 mm.

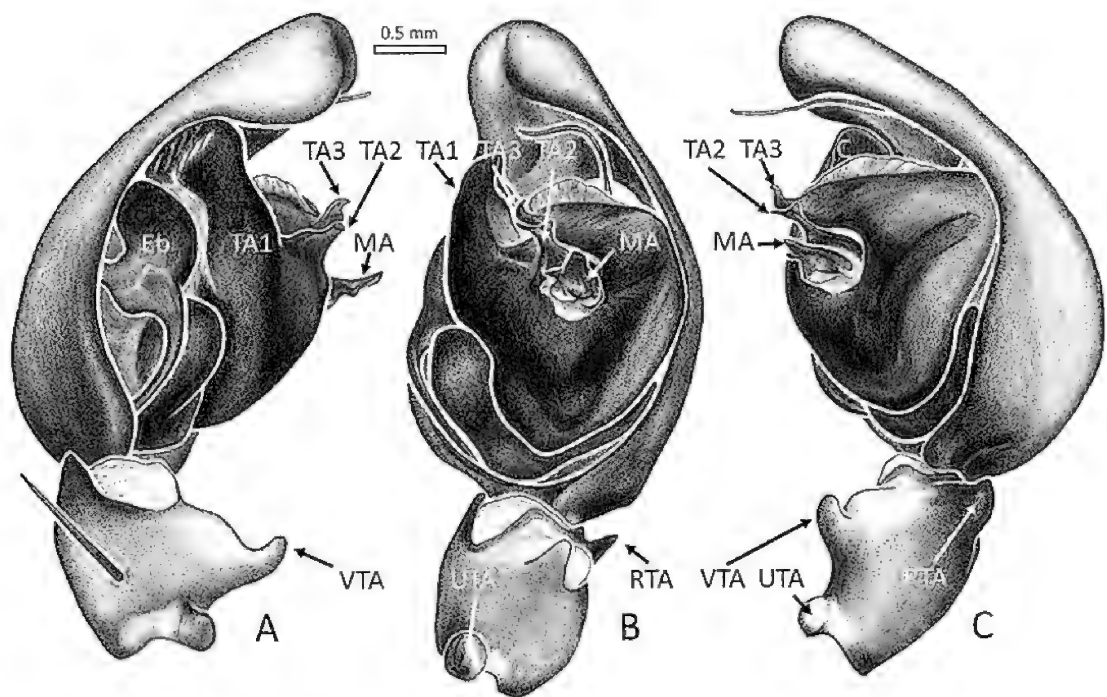


FIGURE 51. *Uduba madagascariensis* (Vinson, 1863), (CASENT9006026) from Ambohimanga, left male palpus. A. Prolateral. B. Ventral. C. Retrolateral. Illustrations by Jenny Speckels. C, conductor; Eb, embolic base; MA, median apophysis; RTA, retrolateral tibial apophysis on male palp; TA1, proapical apophysis of the tegulum; TA2, proapical apophysis of the tegulum; TA3, retroapical apophysis of the tegulum; UTA, basal tibial apophysis on male palp; VTA, ventral tibial apophysis on male palp. Scale bar = 0.5 mm.

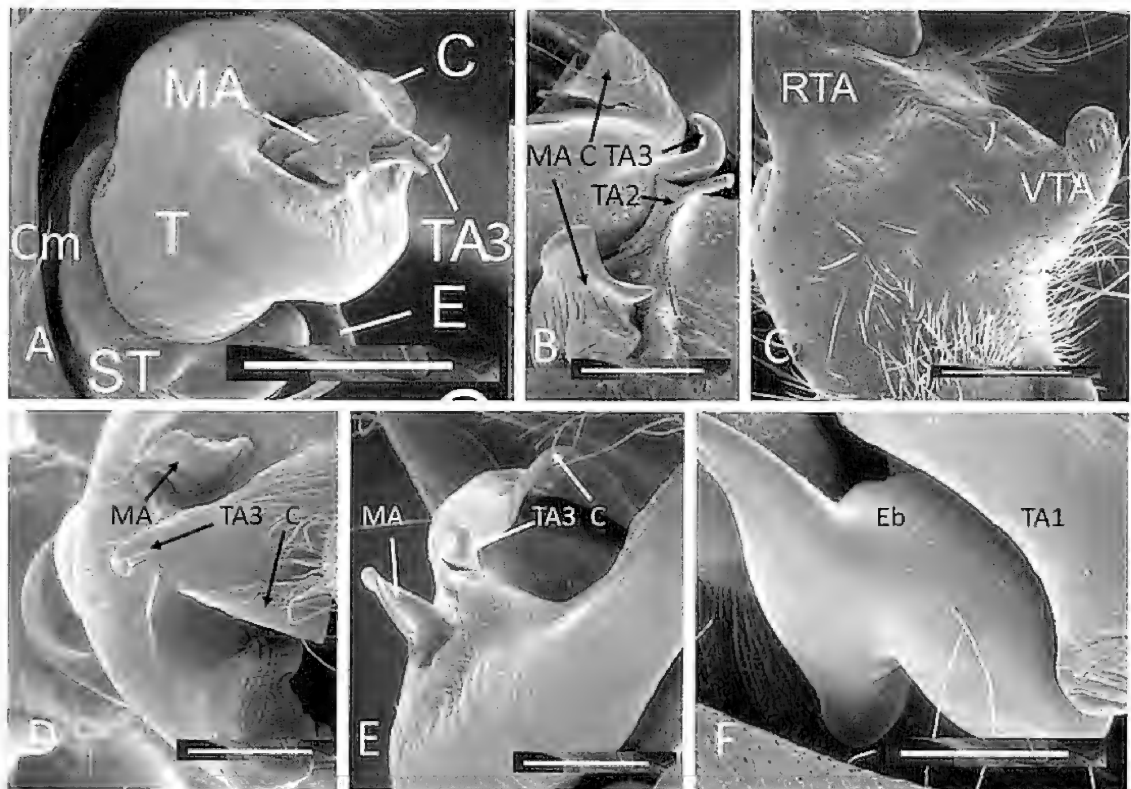


FIGURE 52. *Uduba madagascariensis* (Vinson, 1863), CASENT9006025, forest near Ambohimanga village, right male palpus, SEM. A. Retrolateral. B. Apex, ventral view, showing MA, TA2, TA3 and C. C. Tibia, retrolateral. D. Apical, MA and TA3. E. Prolateral. F. Embolic base and base of TA1. C, conductor; Cm, cymbium; E, embolus; Eb, embolic base; MA, median apophysis; RTA, retrolateral tibial apophysis on male palp; TA1, proapical apophysis of the tegulum; TA2, proapical apophysis of the tegulum; TA3, retroapical apophysis of the tegulum, typically with apex extending to prolateral; VTA, ventral tibial apophysis on male palp. Scale bars A = 1.0 mm, C = 0.5 mm, B, F = 300  $\mu$ m, D, E = 430  $\mu$ m.



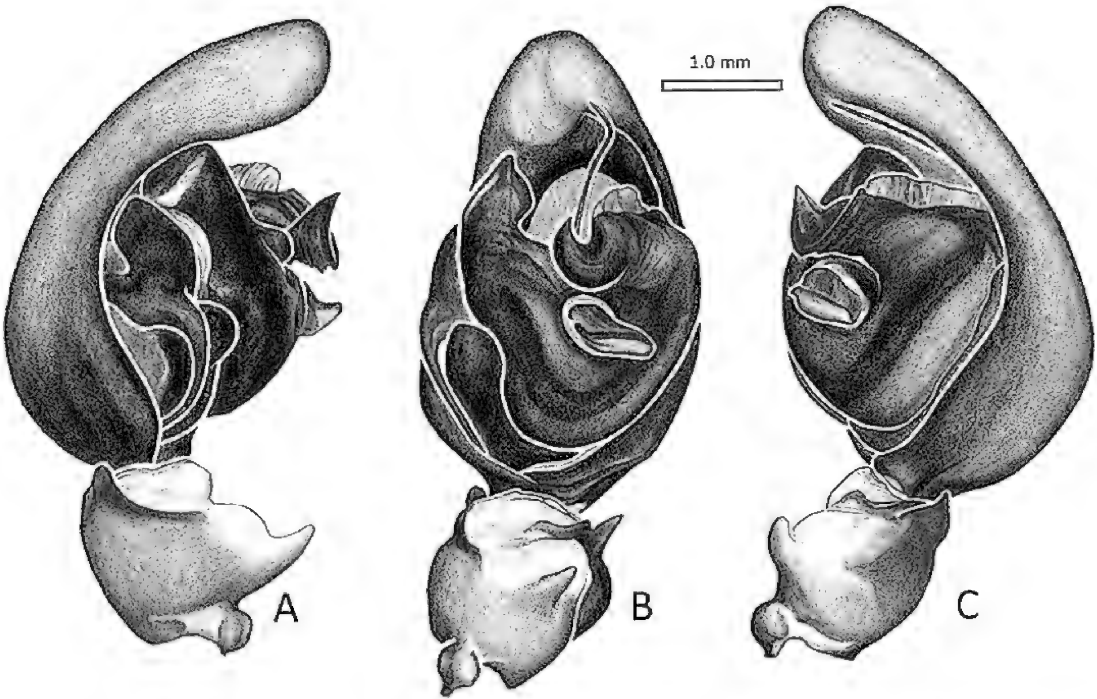


FIGURE 53. *Uduba platnicki*, new species, Holotype male (CASENT9006021) from Marojejy Reserve, left male palpus. A. Prolateral. B. Ventral. C. Retrolateral. Illustrations by Jenny Speckels. Scale bar = 1.0 mm.

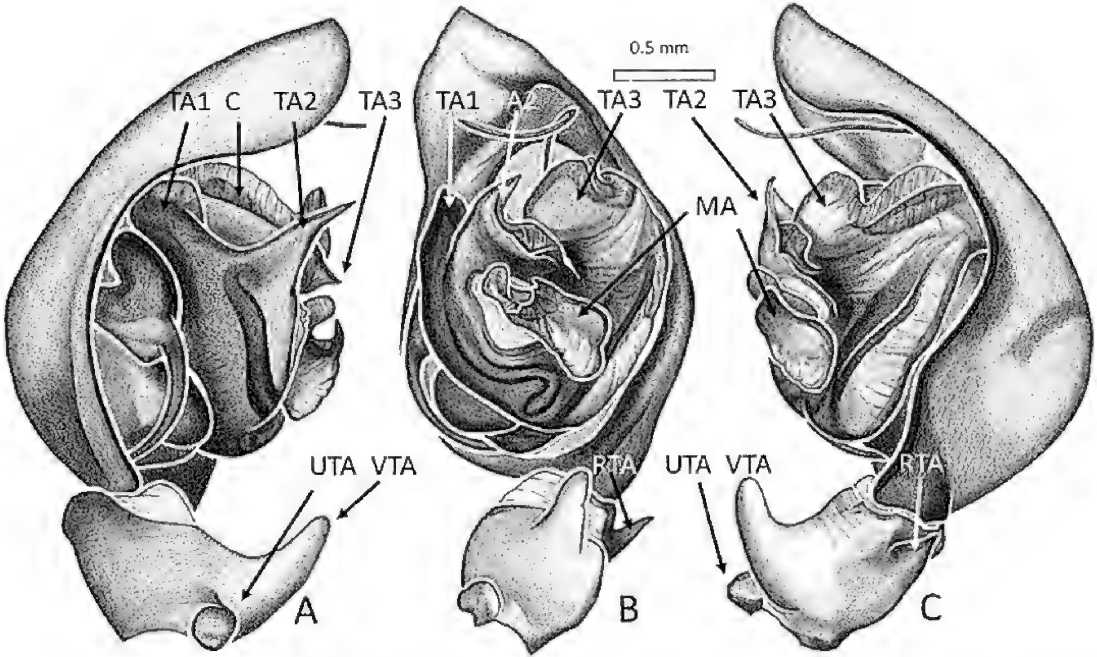


FIGURE 54. *Uduba pseudoevanescens*, new species, Paratype (CASENT9006006) from 57 km Route d'Anosibe de Moramanga, left male palpus. A. Prolateral. B. Ventral. C. Retrolateral. Illustrations by Jenny Speckels. C, conductor; MA, median apophysis; RTA, retrolateral tibial apophysis on male palp; TA1, proapical apophysis of the tegulum; TA2, proapical apophysis of the tegulum; TA3, retroapical apophysis of the tegulum; UTA, basal tibial apophysis on male palp; VTA, ventral tibial apophysis on male palp. Scale bar = 0.5 mm.

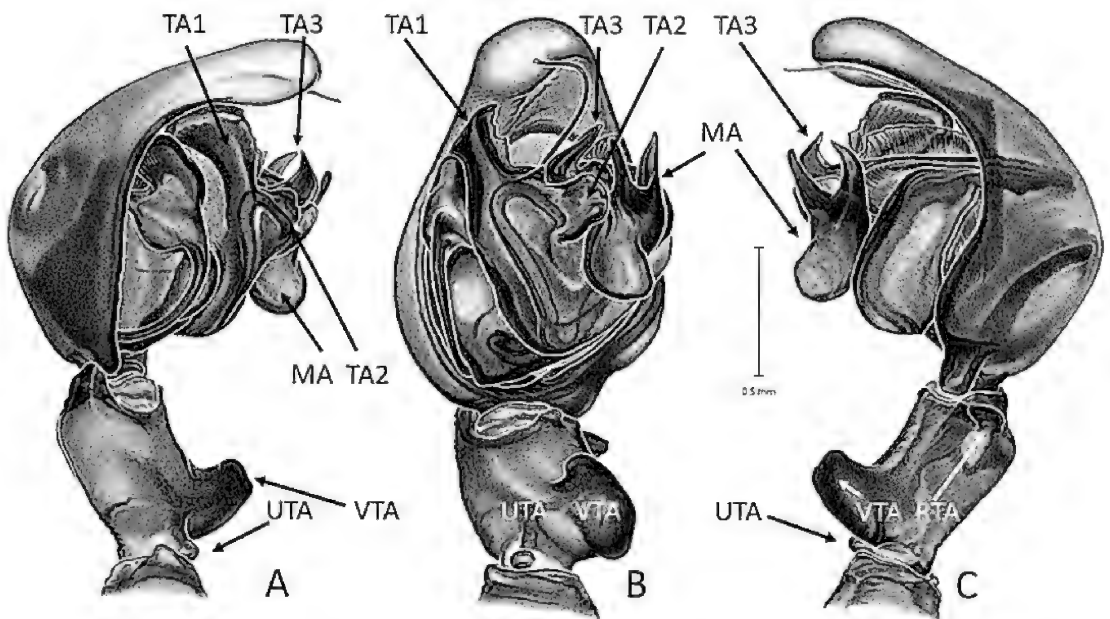


FIGURE 55. *Uduba rajery*, new species, Holotype (CASENT9026393) from Forêt Ambohidena, Ile Sainte Marie, left male palpus. A. Prolateral. B. Ventral. C. Retrolateral. Illustrations by Giovanni Maki. MA, median apophysis; RTA, retrolateral tibial apophysis on male palp; TA1, proapical apophysis of the tegulum; TA2, proapical apophysis of the tegulum; TA3, retroapical apophysis of the tegulum; UTA, basal tibial apophysis on male palp; VTA, ventral tibial apophysis on male palp. Scale bar = 0.5 mm.

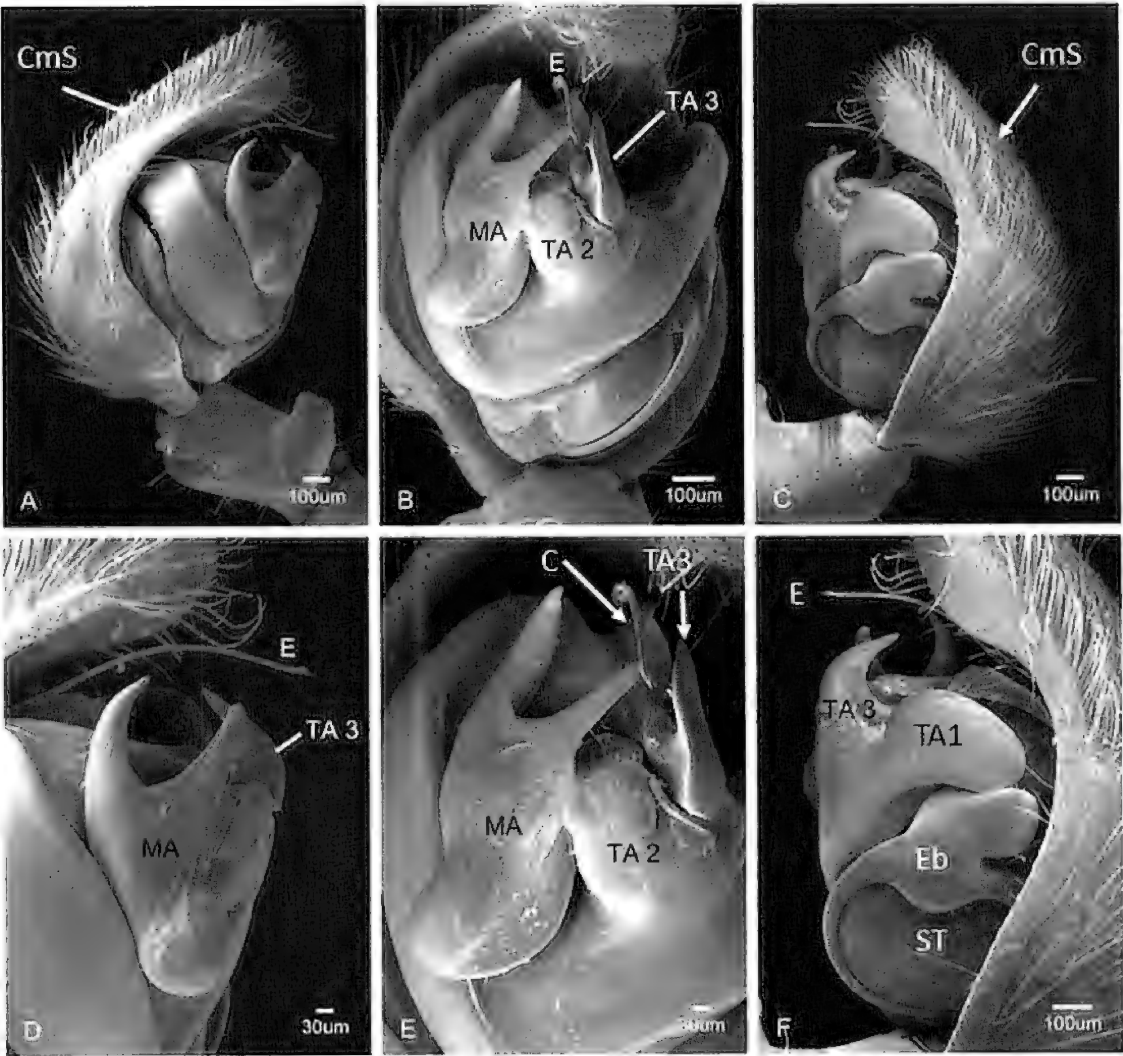


FIGURE 56. *Uduba rajery*, new species, Holotype male (CASENT9026393) from Forêt Ambohidena, Ile Sainte Marie, right palpus, SEM. A. Tibia and tarsus, retrolateral. B. Tarsus, ventral. C. Tibia and tarsus, prolateral. D. Bulb, retrolateral. E. Bulb, proventral. F. Bulb, prolateral. C, conductor; CmS, cymbial scopula (arrows); E, embolus; Eb, embolic base; MA, median apophysis; ST, subtegulum; TA1, proapical apophysis of the tegulum; TA2, proapical apophysis of the tegulum; TA3, retroapical apophysis of the tegulum. Scale bars: A–C, F = 100 μm, D, E = 30 μm.

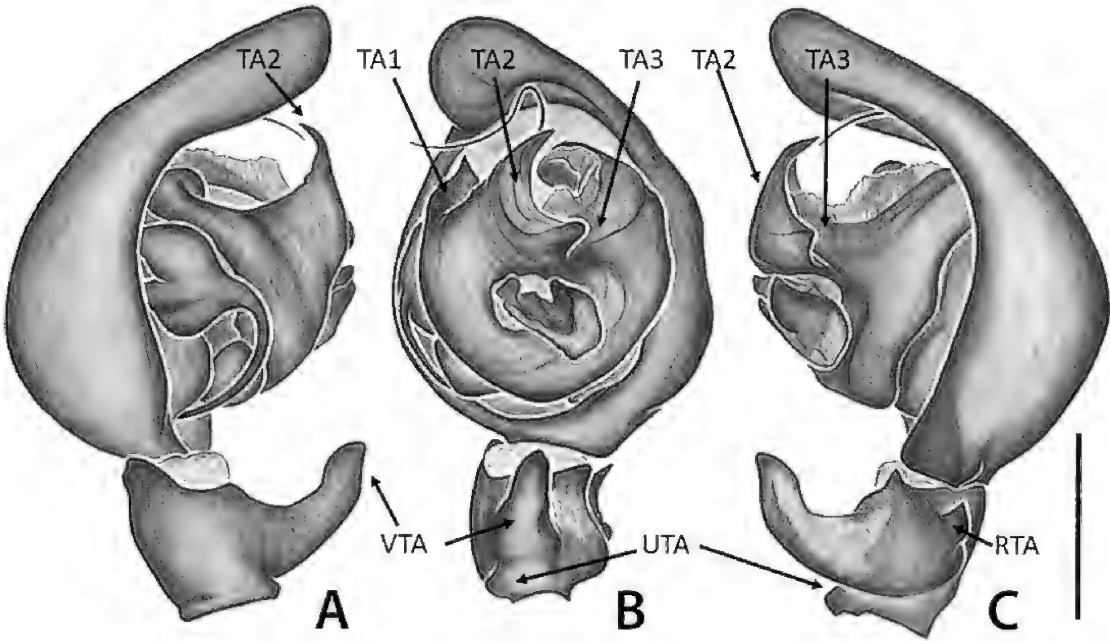


FIGURE 57. *Uduba rakotofrah*, new species, paratype (CASENT9062794), from Anosyenne Mts., left male palpus. A. Prolateral. B. Ventral. C. Retrolateral. Illustrations by Daniele Polotow. RTA, retrolateral tibial apophysis on male palp; TA1, proapical apophysis of the tegulum; TA2, proapical apophysis of the tegulum; TA3, retroapical apophysis of the tegulum; UTA, basal tibial apophysis on male palp; VTA, ventral tibial apophysis on male palp. Scale bar = 1.0 mm.

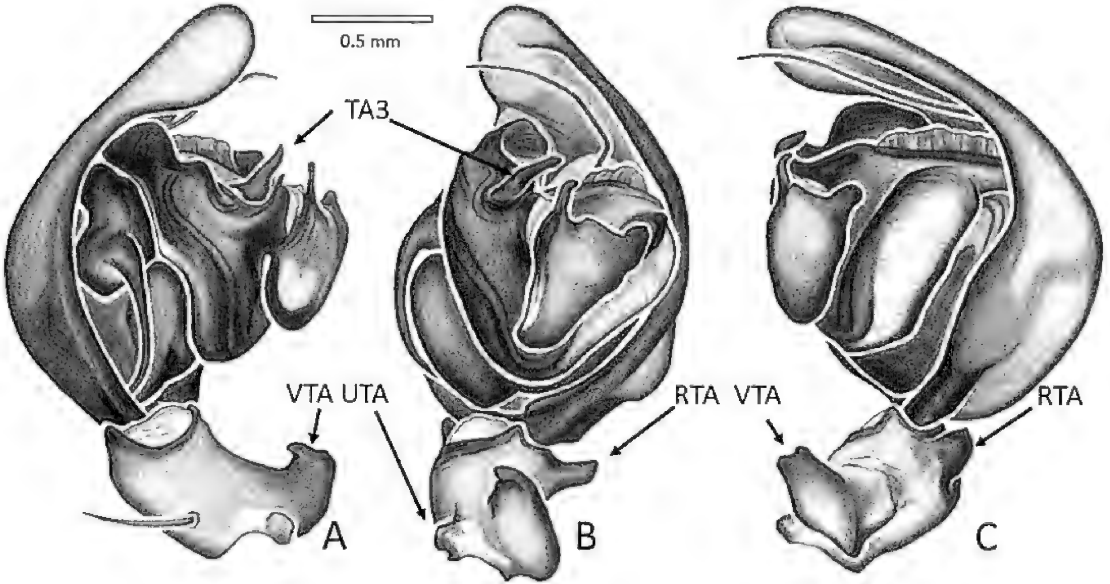


FIGURE 58. *Uduba rakotozafy*, new species, Holotype (CASENT9006024) from Parc National Périnet, left male palpus. A. Prolateral. B. Ventral. C. Retrolateral. Illustrations by Jenny Speckels. RTA, retrolateral tibial apophysis on male palp; TA3, retroapical apophysis of the tegulum; UTA, basal tibial apophysis on male palp; VTA, ventral tibial apophysis on male palp. Scale bar = 0.5 mm.

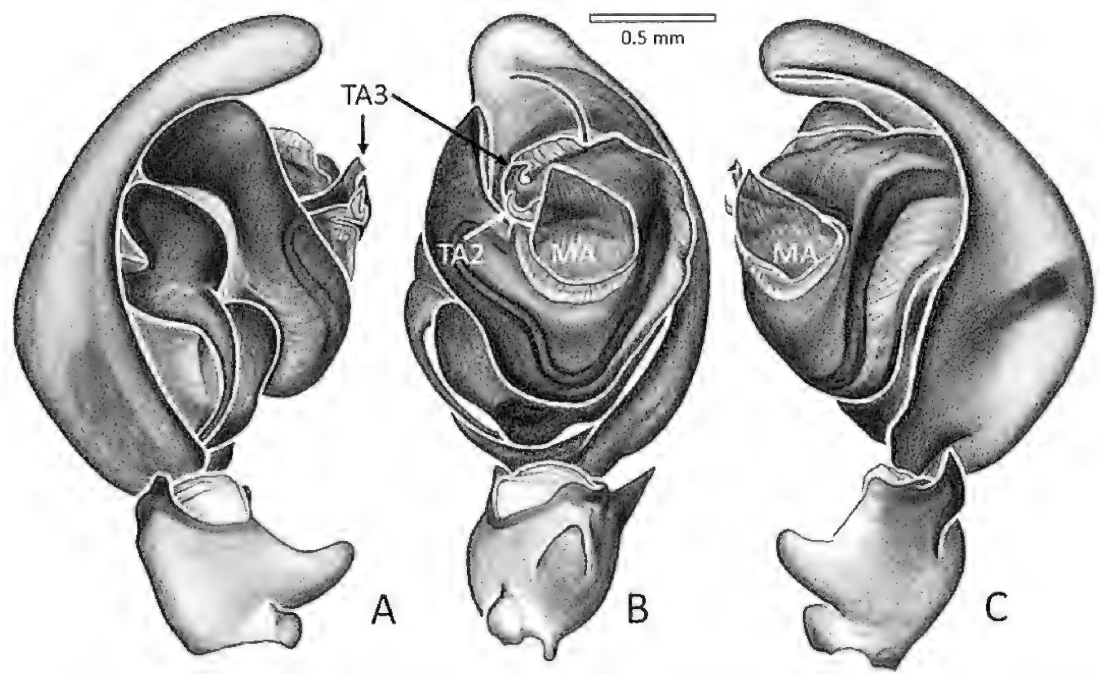


FIGURE 59. *Uduba rinha*, new species, (MRAC174.445) from 25 km W Morarano Chrome, Toamasina Province, left male palpus. A. Prolateral. B. Ventral. C. Retrolateral. Illustrations by Jenny Speckels. MA, median apophysis; TA2, proapical apophysis of the tegulum; TA3, retroapical apophysis of the tegulum. Scale bar = 0.5 mm.

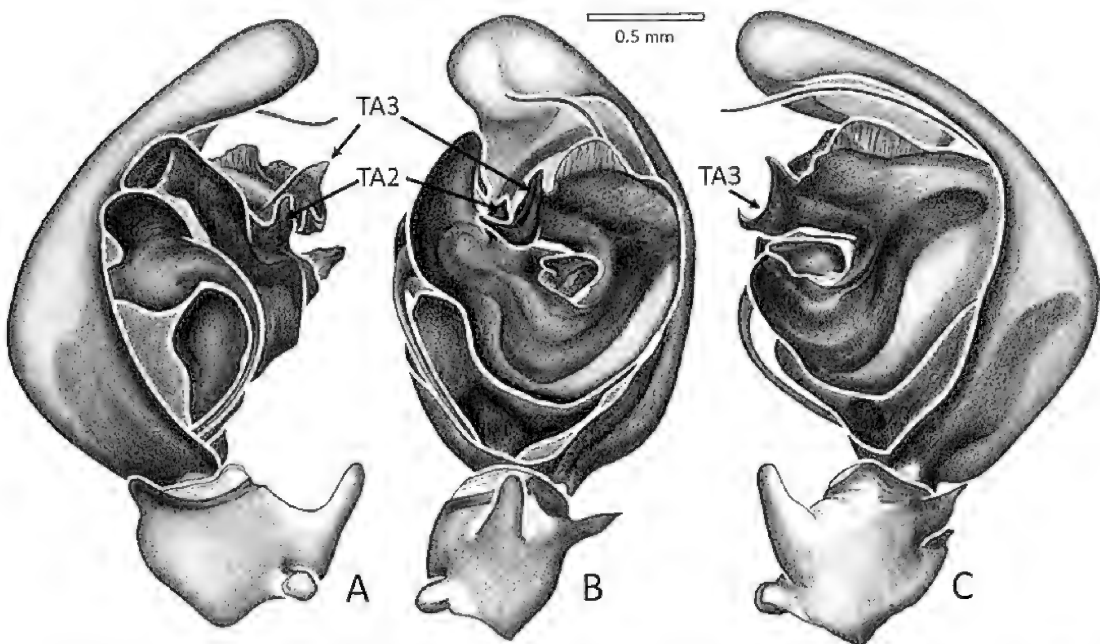


FIGURE 60. *Uduba salegy*, new species, Holotype (CASENT9006044) from Parc National Montagne d'Ambre, left male palpus. A. Prolateral. B. Ventral. C. Retrolateral. TA2, proapical apophysis of the tegulum; TA3, retroapical apophysis of the tegulum. Scale bar = 0.5mm.

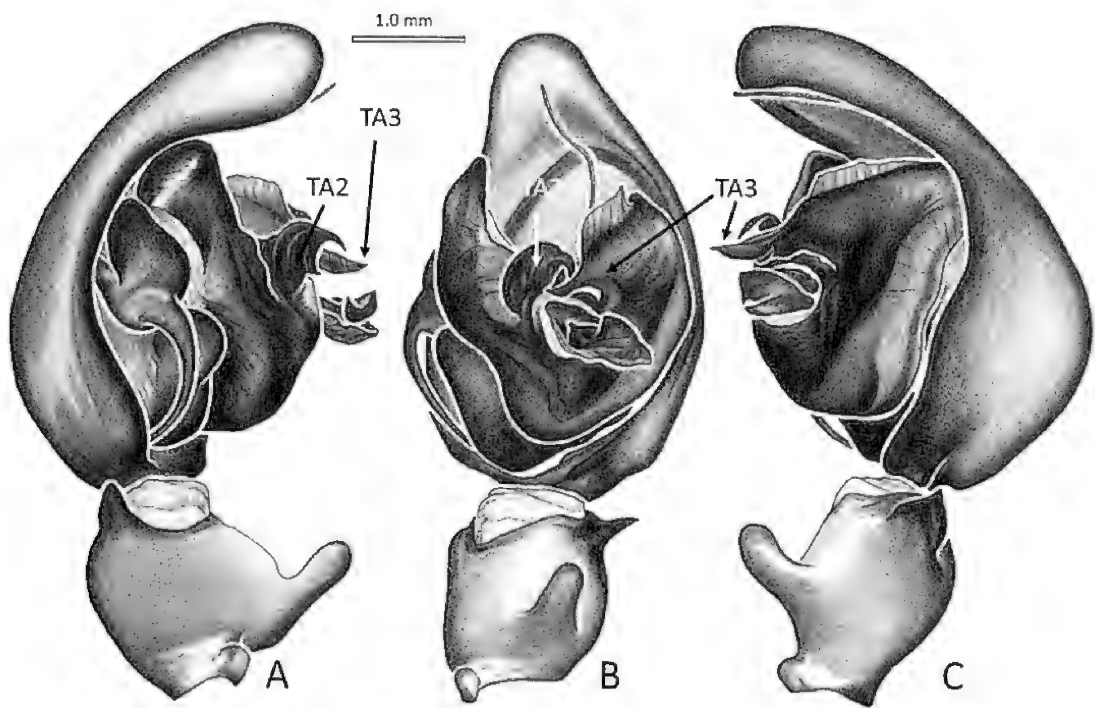


FIGURE 61. *Uduba schlingeri*, new species, (CASENT9006062) from Parc National Ranomafana, left male palpus. A. Prolateral. B. Ventral. C. Retrolateral. Illustrations by Jenny Speckels. TA2, proapical apophysis of the tegulum; TA3, retroapical apophysis of the tegulum. Scale bar = 1.0 mm.



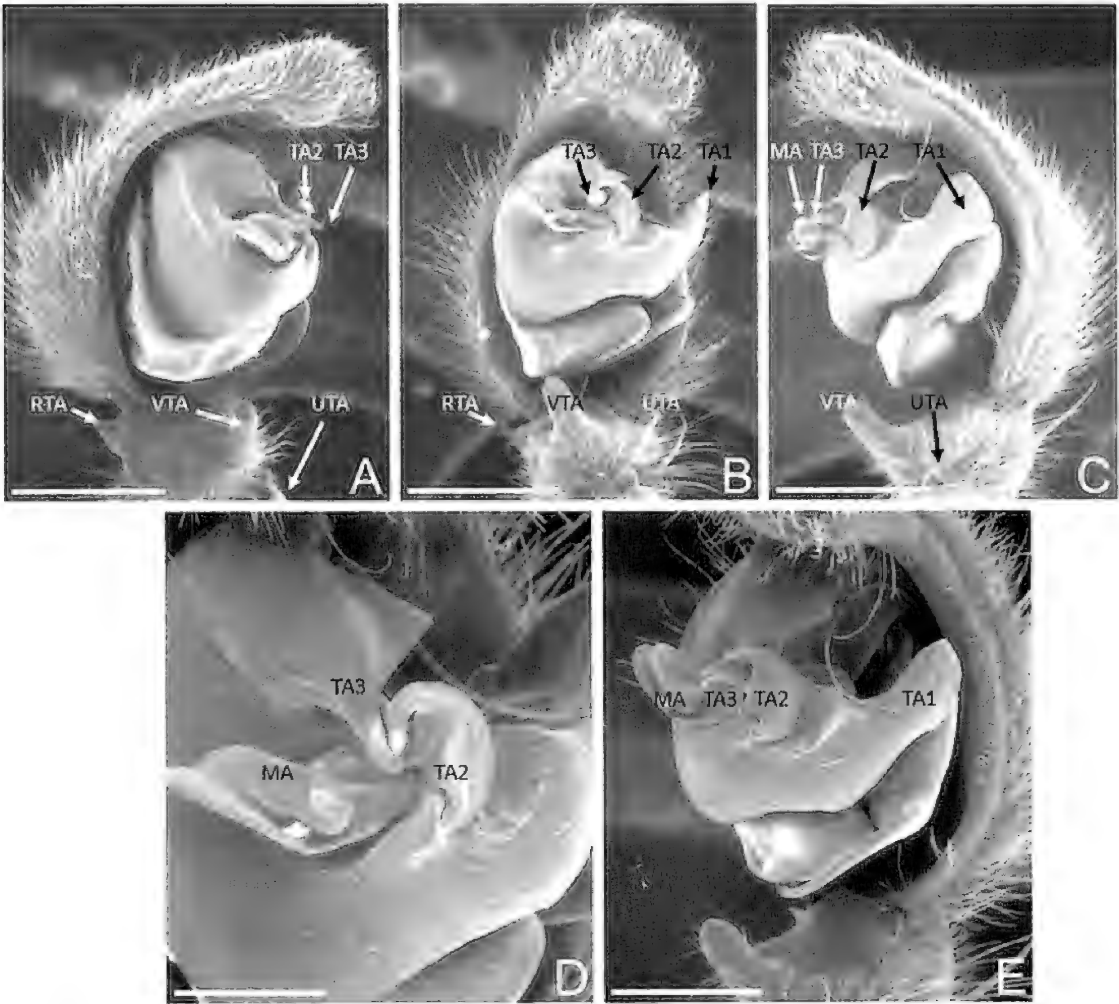


FIGURE 62. *Uduba schlingeri*, new species, CASENT9006059 from Andohahela, right male palpus, SEM. A. Tibia and tarsus, retrolateral. B. Tibia and tarsus, ventral. C. Tibia and tarsus, ventrolateral. D. Bulb, apical. E. Bulb, proventral. MA, median apophysis; RTA, retrolateral tibial apophysis on male palp; TA1, proapical apophysis of the tegulum; TA2, proapical apophysis of the tegulum; TA3, retroapical apophysis of the tegulum; UTA, basal tibial apophysis on male palp; VTA, ventral tibial apophysis on male palp. Scale bars: A–C = 1500  $\mu$ m, D = 600  $\mu$ m, E = 1000  $\mu$ m.

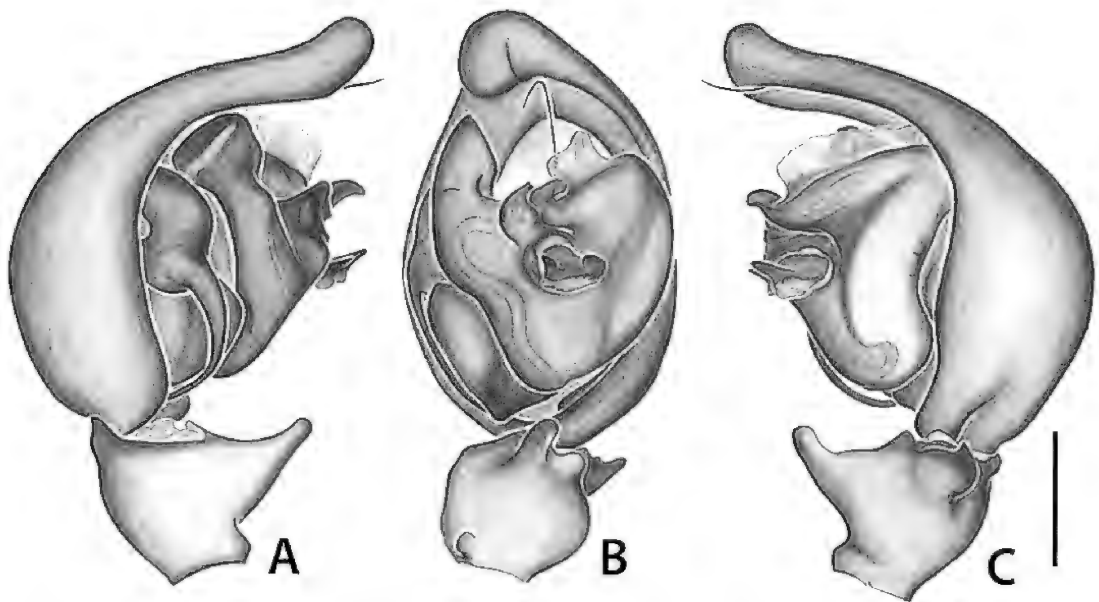


FIGURE 63. *Uduba taralily*, new species, Holotype (CASENT9042524) from Miandritsara Forest, left male palpus. A. Prolateral. B. Ventral. C. Retrolateral. Illustrations by Daniele Polotow. Scale bar = 1.0 mm.

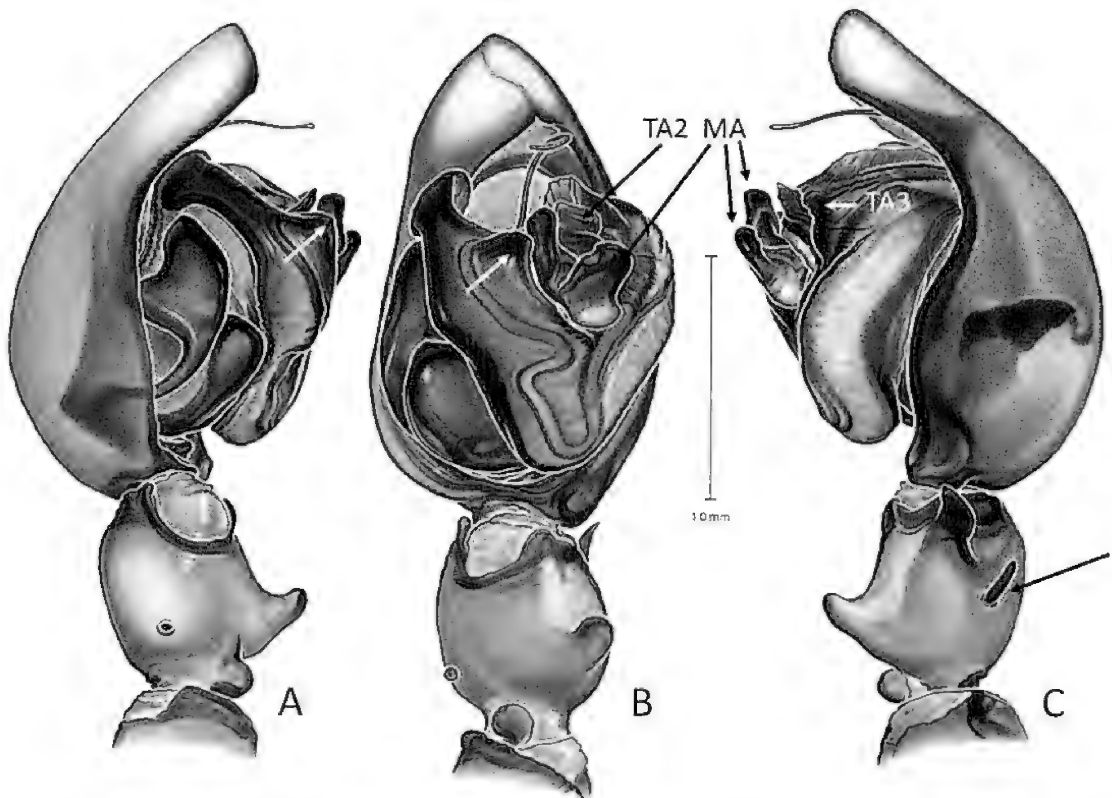


FIGURE 64. *Uduba valilia*, new species, Holotype (CASENT9026394) from Forêt de Vevembe, left male palpus. A. Prolateral. B. Ventral. C. Retrolateral. Illustrations by Rachel Diaz-Bastin. MA, median apophysis; TA2, proapical apophysis of the tegulum; TA3, retroapical apophysis of the tegulum (mostly hidden behind TA2 in this species). White arrows to bump on tegulum, black arrow to stout retrolateral spine on tibia. Scale bar = 1.0 mm.

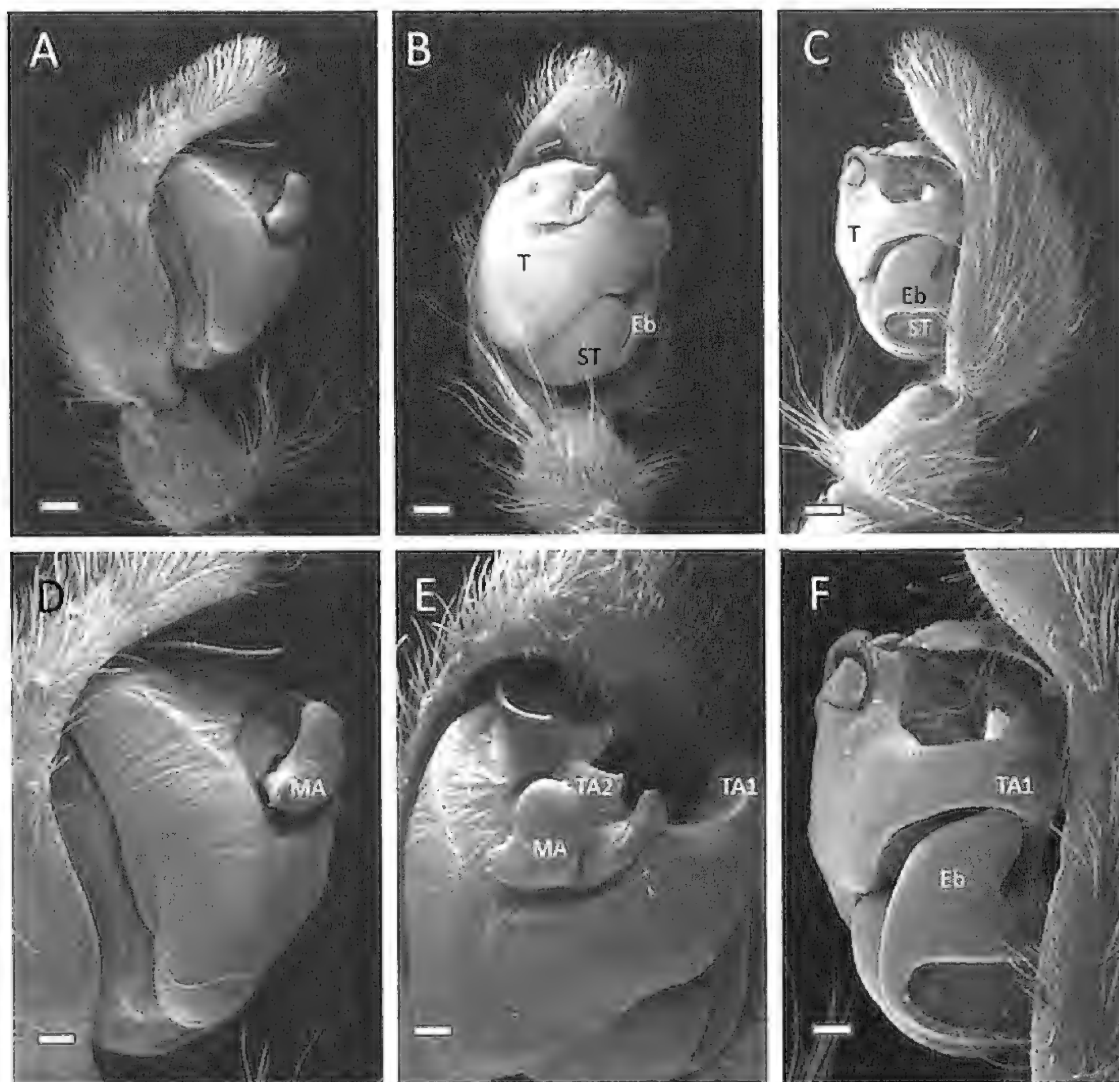


FIGURE 65. *Uduba valiha*, new species, Holotype male (CASENT9026394) from Forêt de Vevembe, left palpus, SEM. A. Tibia and tarsus, prolateral. B. Tibia and tarsus, ventral. C. Tibia and tarsus, prolateral. D. Bulb, retrolateral. E. Bulb, retroventral. F. Bulb, prolateral. Eb, embolic base; MA, median apophysis; ST, subtegulum; T, tegulum; TA1, proapical apophysis of the tegulum; TA2, proapical apophysis of the tegulum. Scale bars: A–C = 200  $\mu$ m, D–F = 100  $\mu$ m.

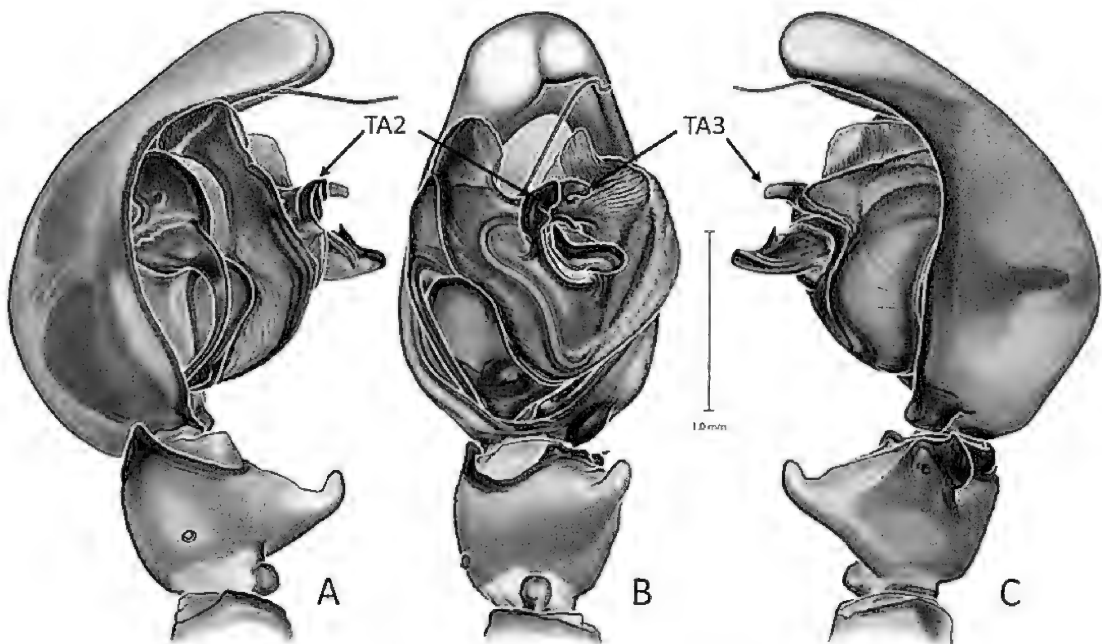


FIGURE 66. *Uduba woodae*, new species, Holotype (CASENT9017834) from Lake Ranobe, left male palpus. A. Prolateral. B. Ventral. C. Retrolateral. Illustrations by Giovanni Maki. TA2, proapical apophysis of the tegulum; TA3, retroapical apophysis of the tegulum. Scale bar = 1.0 mm.

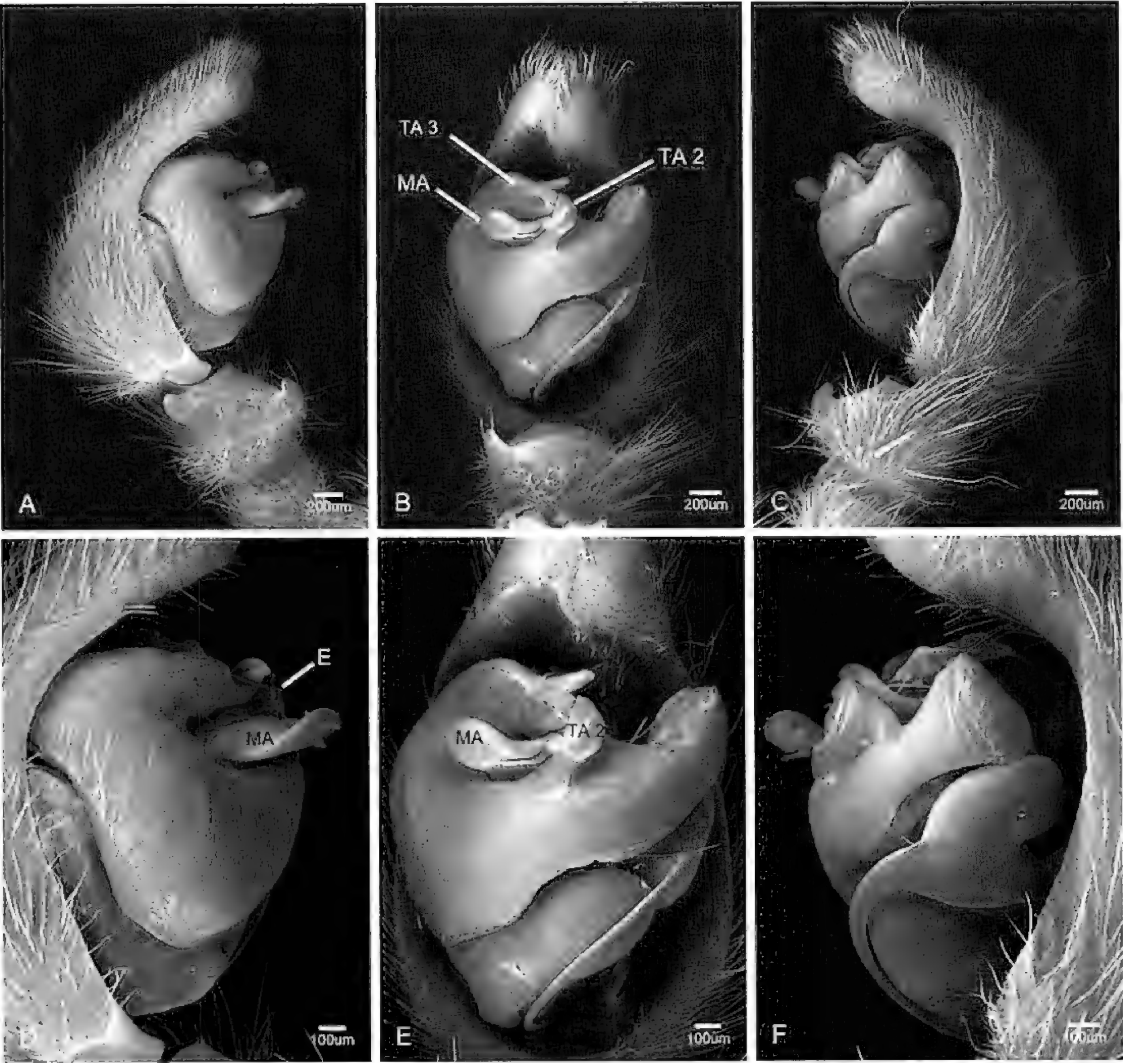


FIGURE 67. *Uduba woodae*, new species, CASENT9017834 from Lake Ranobe, right male palpus, SEM. A. Tibia and tarsus, retrolateral. B. Tibia and tarsus, ventral. C. Tibia and tarsus, prolateral. D. Bulb, retrolateral. E. Bulb, ventral. F. Bulb, prolateral. E, embolus; MA, median apophysis; TA2, proapical apophysis of the tegulum; TA3, retroapical apophysis of the tegulum. Scale bars: A–C = 200µm, D–F = 100 µm.

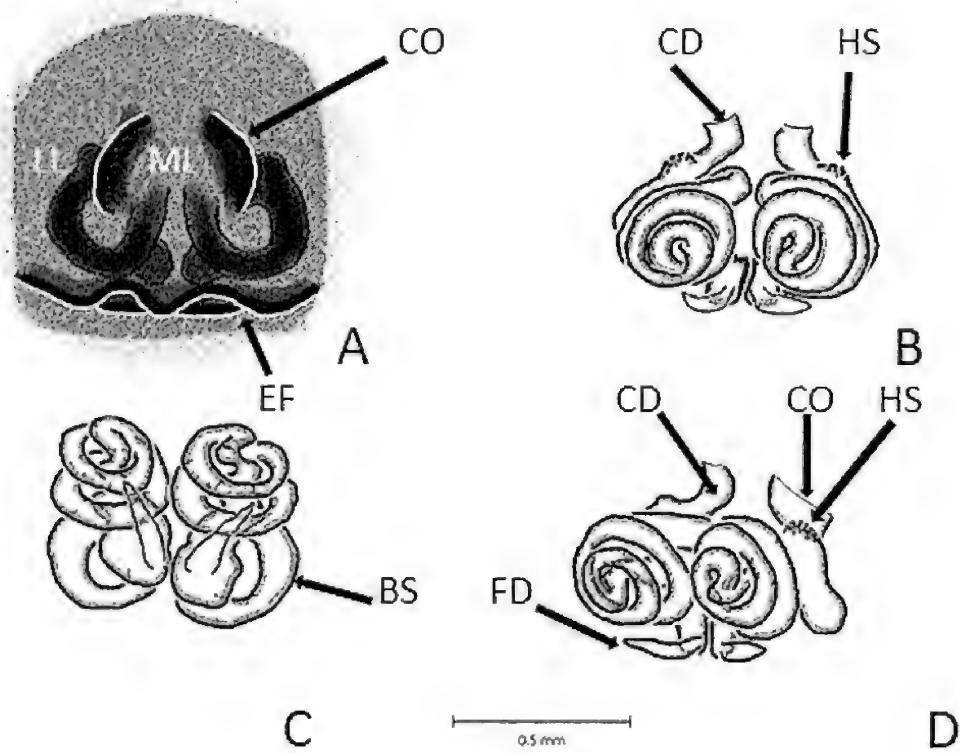


FIGURE 68. *Uduba madagascariensis* (Vinson, 1863), Tananarive, December 1946, J. Millot, MNHN, Paris, female genitalia drawings. A. Epigynum, ventral. B–D. Vulva, cleared. B. Anterodorsal. C. Posterodorsal. D. Dorsolateral. Illustrations by Charles Griswold. BS, spermathecal base; CD, copulatory duct; CO, copulatory opening; EF, epigastric furrow; FD, fertilization duct; HS, spermathecal head; LL, lateral lobe of epigynum; ML, median lobe of epigynum. Scale bar = 0.5 mm.



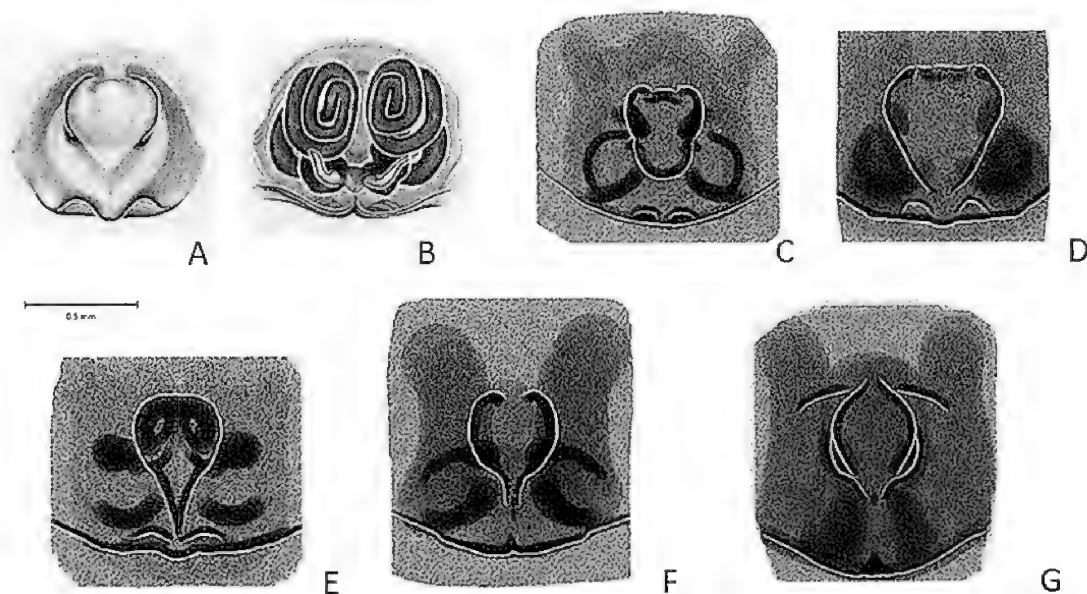


FIGURE 69. *Uduba madagascariensis* (Vinson, 1863), female genitalia drawings. A, B. Ambohimanga, forest near village (CASENT9006029). C. Forêt Analavelona (CASENT9018653). D. Forêt Analavelona (CASENT9006028). E. Forêt Analavelona (CASENT9018653). F. Forêt Analavelona (CASENT9018670). G. Réserve Forestière Beanka (CASENT9042529). A, C-G. Epigynum, ventral. B. Vulva, dorsal. Illustrations A, B by Jenny Speckels, C-G by Charles Griswold. Scale bar = 0.5 mm.

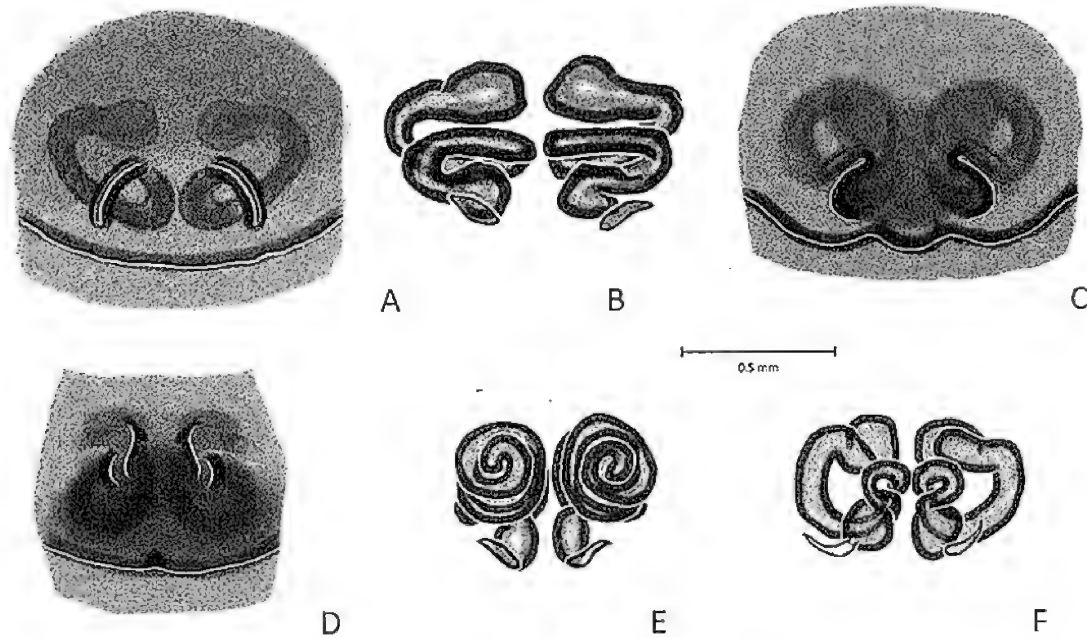


FIGURE 70. *Uduba* spp., female genitalia drawings. A, B. *U. danielae*, new species, paratype (CASENT9014779) from Ambohitantly. D, E. *Uduba sarotra*, new species, holotype (CASENT9030916) from Parc National de Marojejy. C, F. *U. jayjay*, new species, holotype (CASENT9004079) from Anjozorobe. A, C, D. Epigynum, ventral. B, E, F. Vulva, dorsal. Illustrations by Charles Griswold. Scale bar = 0.5 mm.

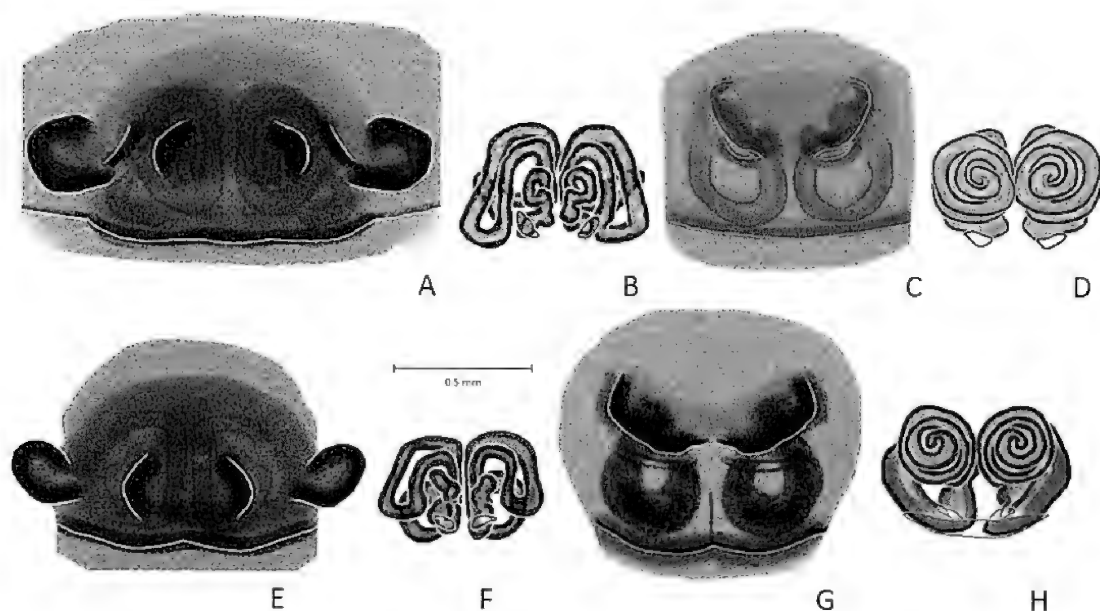


FIGURE 71. *Uduba* spp., female genitalia drawings. A, B. *U. pseudoevanescens*, new species, holotype (CASENT9006008) from Périnet. C, D. *U. irwini*, new species, Paratype (CASENT9009383) from Parc National Tsingy de Bemaraha. E, F. *U. evanescens* (Dahl, 1901) (CASENT9024032) from Parc National Ranomafana. G, H. *U. rinha*, new species, paratype (CASENT9018660), Parc National de Namoroka. A, C, E, G. Epigynum, ventral. B, D, F, H. Vulva, dorsal. Illustrations by Charles Griswold. Scale bar = 0.5 mm.

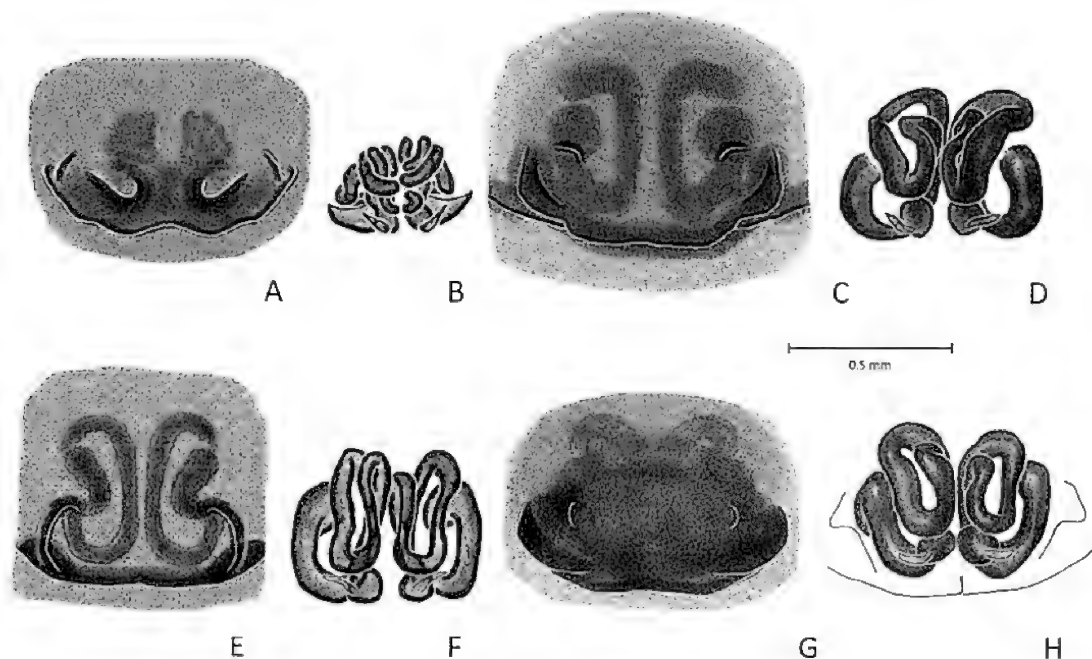


FIGURE 72. *Uduba* spp., female genitalia drawings. A, B. *U. heliani*, new species, holotype (CASENT9006106) from Forêt Classée Andriantantely. C, D. *U. hiragasy* new species, paratype (CASENT9064772) from Tsinjoarivo Forest. E, F. *U. fisheri*, new species, (CASENT9065339) from 2 km W Andrambovato along River Tatamaly. G, H. *U. valiha*, new species, paratype (CASENT9006071) from Massif Andringitra. A, C, E, G. Epigynum, ventral. B, D, F, H. Vulva, dorsal. Illustrations by Charles Griswold. Scale bar = 0.5 mm.

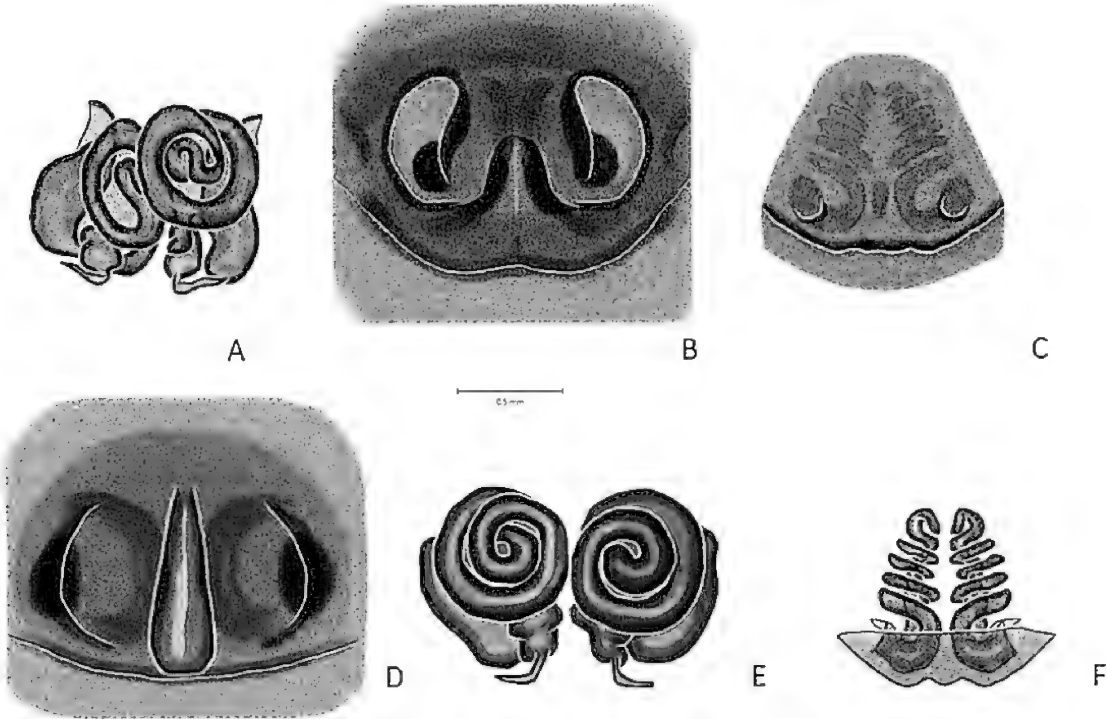


FIGURE 73. *Uduba* spp., female genitalia drawings. A, B. *U. ibonia*, new species, paratype (CASENT9006035), from Parc National Ranomafana. C, F. *U. ida*, new species, holotype (CASENT9042534) from Station Forestière Analamazao- tra. D, E. *U. schlingeri*, new species (CASENT9006057) from Parc National Ranomafana. B–D. Epigynum, ventral. A, E, F. Vulva, dorsal. Illustrations by Charles Griswold. Scale bar = 0.5 mm.

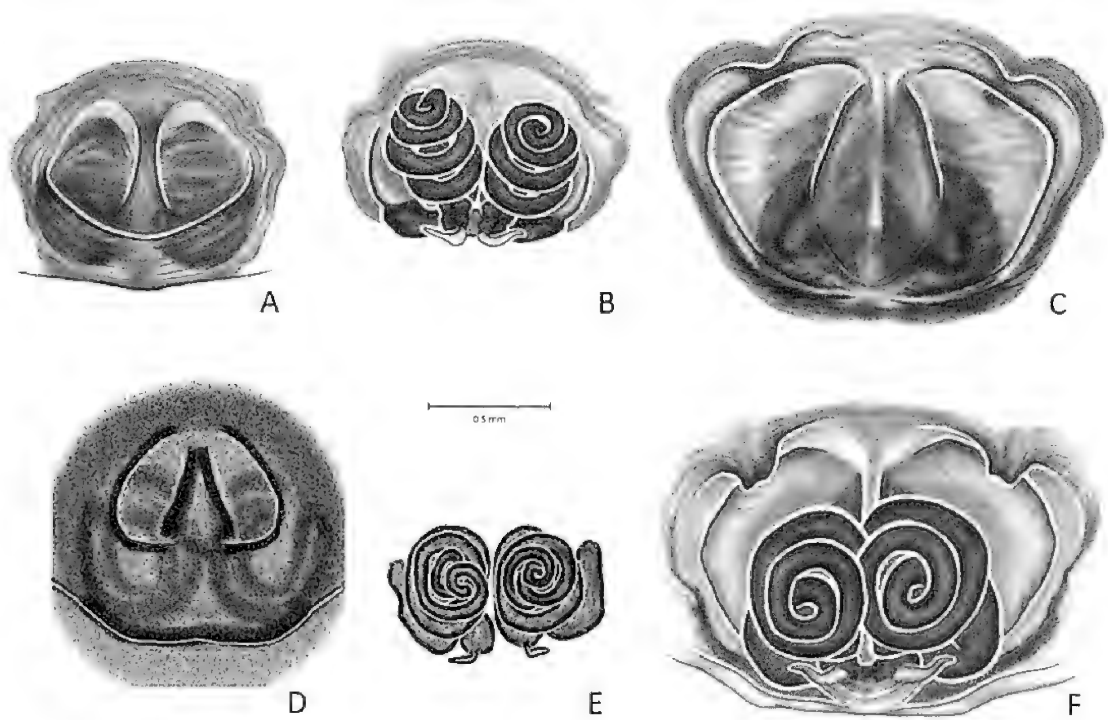


FIGURE 74. *Uduba* spp., female genitalia drawings. A, B. *U. salegy*, new species, paratype (CASENT9006045) Parc National Montagne d'Ambre. C, F. *U. halabe*, new species, paratype (CASENT9006015) Réserve Naturelle Intégrale d'Andohahela. D, E. *U. balsama*, new species, paratype (CASENT9013532) from Forêt de Kirindy. A, C, D. Epigynum, ventral. B, E, F. Vulva, dorsal. Illustrations A–C, F by Jenny Speckels, D, E by Charles Griswold. Scale bar = 0.5 mm.

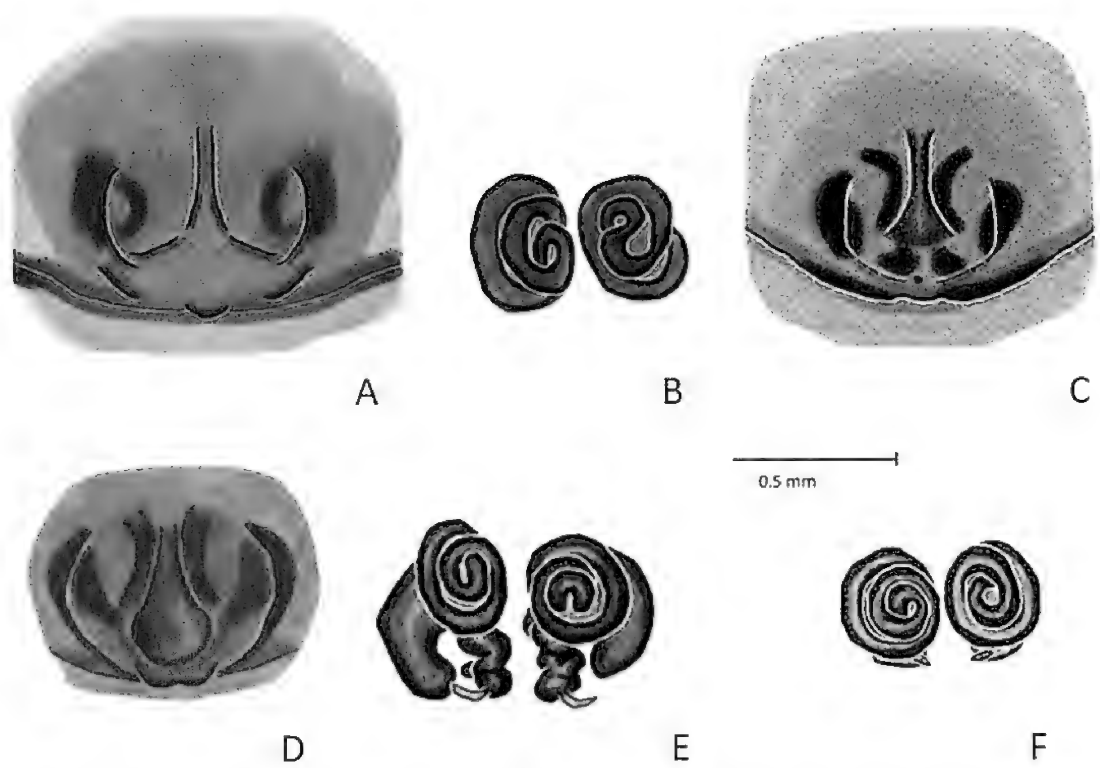


FIGURE 75. *Uduba* spp., female genitalia drawings. A, B. *U. lavitra*, new species, holotype (CASENT9030898) from Torotorofotsy. C, F. *U. lavitra*, new species, paratype (CASENT9030895) from Ambatovy. D, E. *U. orona*, new species, holotype (CASENT9006101) from Andringitra Reserve. A, C, D. Epigynum, ventral. B, E, F. Vulva, dorsal. Illustrations by Charles Griswold. Scale bar = 0.5 mm.

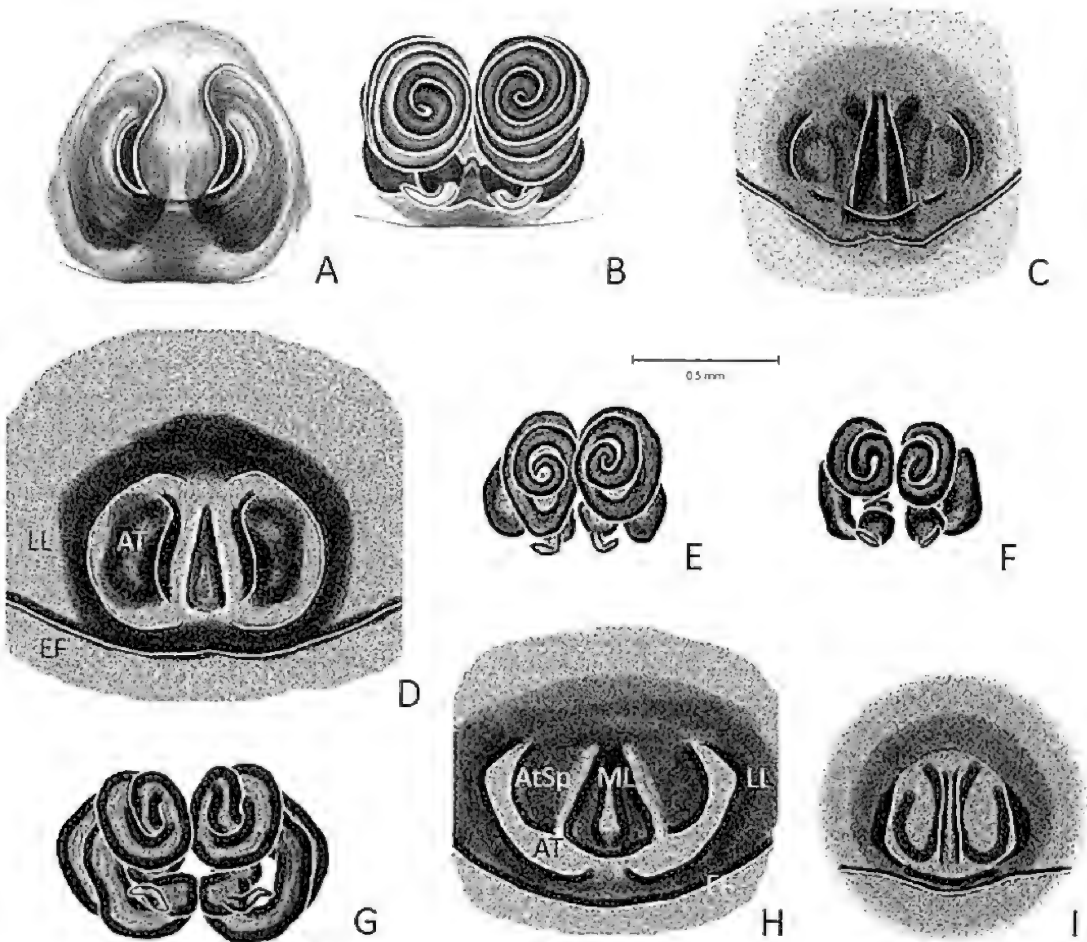


FIGURE 76. *Uduba* spp., female genitalia drawings. A, B. *U. barbarae*, new species, paratype (CASENT9006064) from Lokobe Forest on the island of Nosy Be. C, F, I. *U. milamina*, new species. C. Holotype (CASENT9010797) from a malaise canopy trap at the Ranomafana-Radio Tower. F, I. Paratype (CASENT9006100) from Andringitra Reserve. D, E. *U. kavanaughi*, new species, paratype (CASENT9003517) from Talatakely, Parc National Ranomafana. G, H. *U. platnicki*, new species, paratype (CASENT9030253) from Mikira Forest. A, C, D, H, I. Epigynum, ventral. B, E, F, G. Vulva, dorsal. Illustrations A, B by Jenny Speckels, C–I by Charles Griswold. At, atrium of epigynum; AtSp, atrial side plate of epigynum; EF, epigastric furrow; LL, lateral lobe of epigynum; ML, median lobe of epigynum. Scale bar = 0.5 mm.



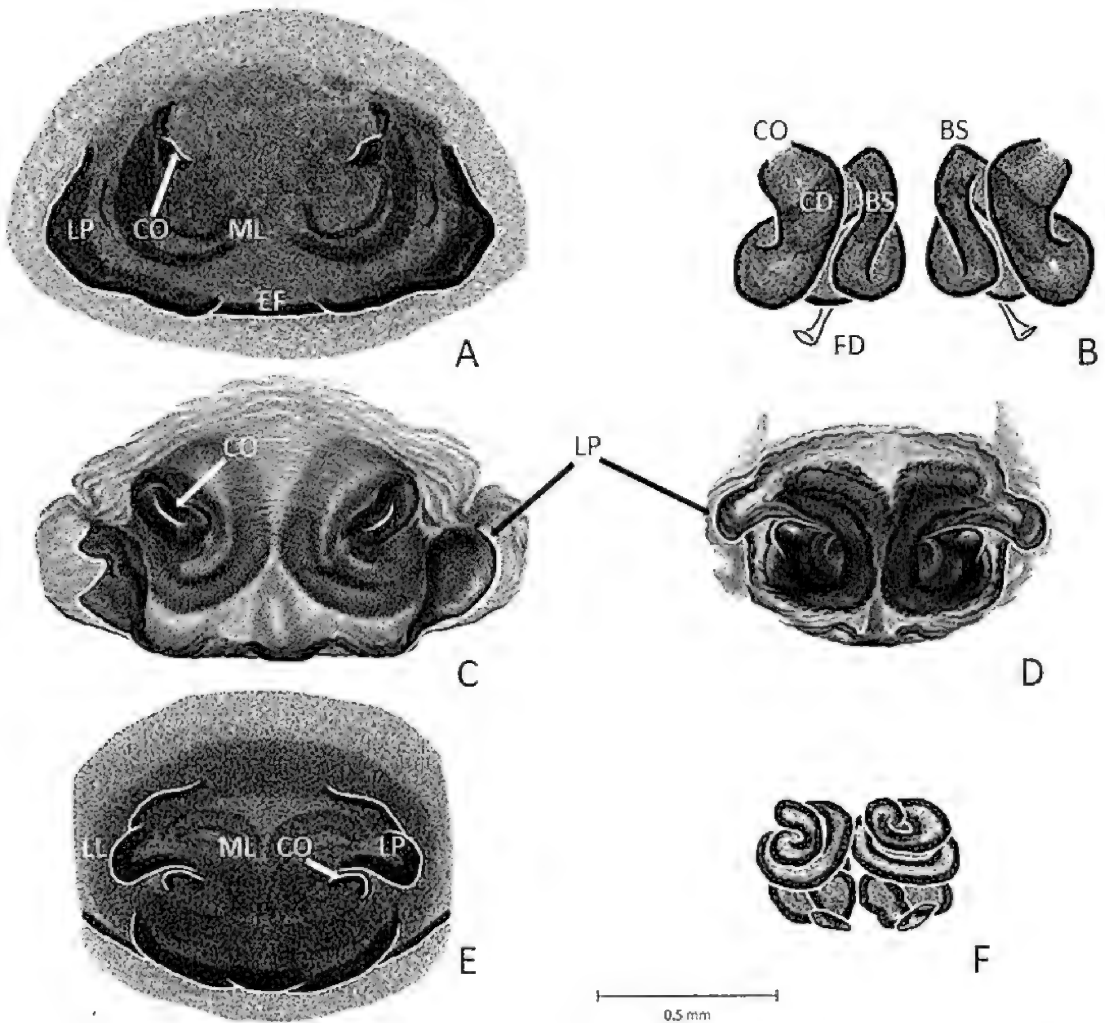


FIGURE 77. *Uduba* spp., female genitalia drawings. A–C. *U. goodmani*, new species. A, B. Paratype female (CASENT9009538) from montane rainforest at 900m elevation at Col du Sedro in Parc National d’Andohahela. C. Holotype (CASENT9006074) from camp #5 at 1875m elevation in Réserve Naturelle Intégrale d’Andohahela. D–F. *U. volana*, new species, holotype (CASENT9006072) dug from a burrow at 1400m elevation at Ambohimanga. A, C, D, E. Epigynum, ventral. B, F. Vulva, dorsal. Illustrations C–D by Jenny Speckels, A–B, E–F by Charles Griswold. BS, base of spermatheca of vulva; CD, copulatory ducts of vulva; CO, copulatory openings of epigynum; EF, epigastric furrow of abdomen; FD, fertilization duct of vulva; HS, head of spermatheca of vulva, including spermathecal poreplate; LL, lateral lobe of epigynum; LP, lateral process of epigynum; ML, median lobe of epigynum. Scale bar = 0.5 mm.

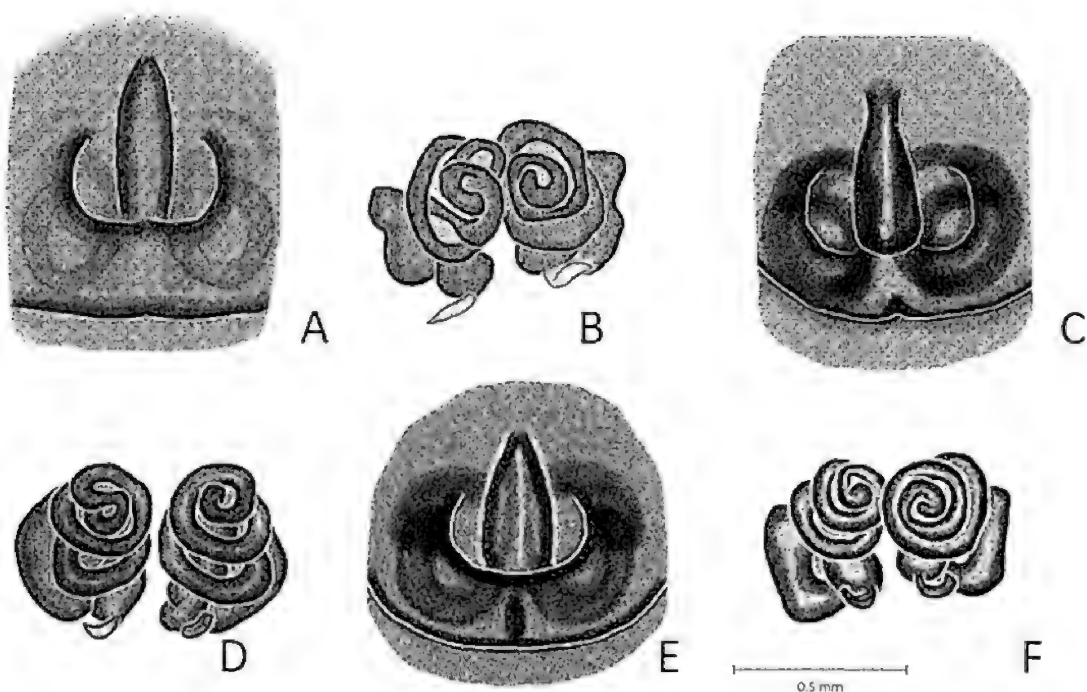


FIGURE 78. *Uduba woodae*, new species, female genitalia drawings. A, B. Forêt de Beroboka (CASENT9000536). C, D. Ambovombe, Carougeau, Muséum Paris (CASENT9006092). E, F. Paratype (CASENT9017834) from Lake Ranobe. A, C, E. Epigynum, ventral. B, D, F. Vulva, dorsal. Illustrations by Charles Griswold. Scale bar = 0.5 mm.

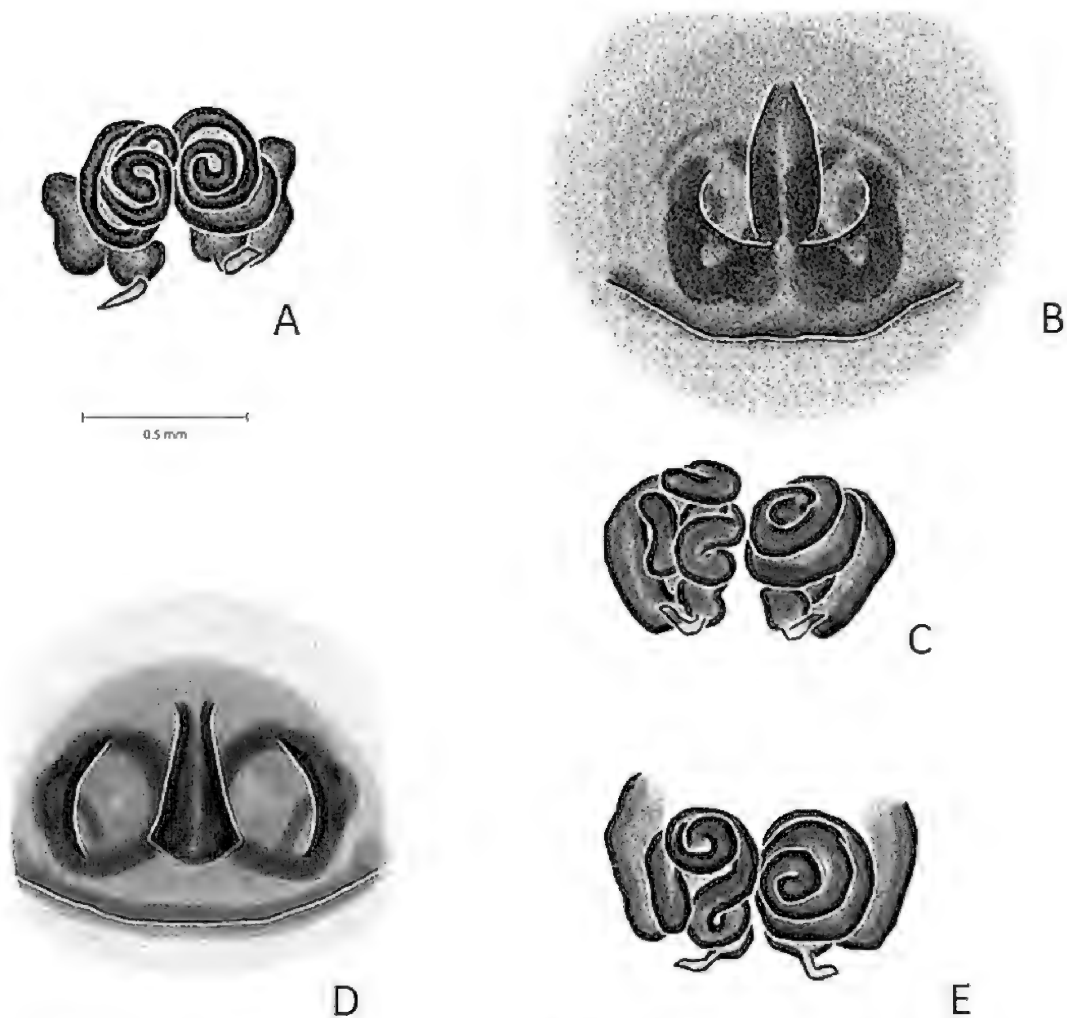


FIGURE 79. *Uduba* spp., female genitalia drawings. A, B. *U. woodae*, new species, (CASENT9000536) Forêt de Beroboka. C–E. *Uduba fumerea* Simon 1906, holotype. B, D. Epigynum, ventral. A, C. Vulva, dorsal. E. Vulva, anterodorsal. Illustrations by Charles Griswold. Scale bar = 0.5 mm.

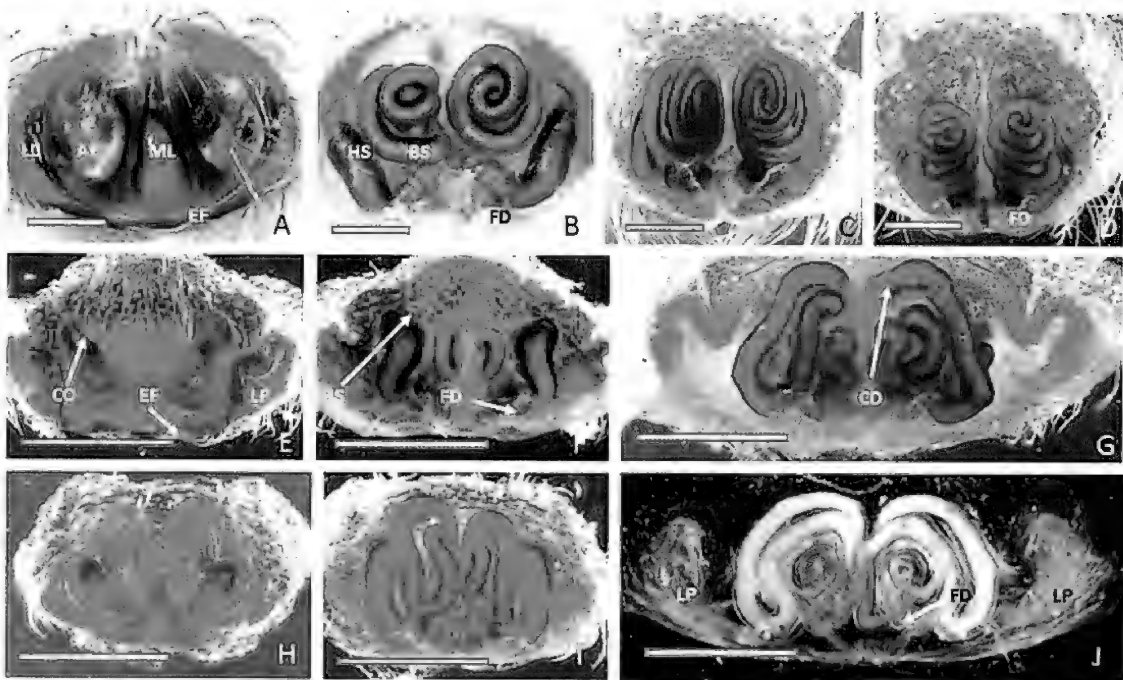


FIGURE 80. *Uduba* spp., ♀ genitalia. A, B. *U. schlingeri*, new species, CASENT9006075 from Vatoharanana, Ranomafana National Park. C. *U. madagascariensis* (Vinson, 1863), CASENT9006029 from forest near Ambohimanga Village. D. *U. woodae*, new species, CASENT9006092 from Ambovombe, Carougeau, MNHN, Muséum Paris. E, F. *U. goodmani*, new species, Holotype (CASENT9006074), from Réserve Naturelle Intégrale d'Andohahela. G. *U. evanescens* (Dahl, 1901) CASENT9006083 from Forêt Ambohimaso. H, I. *U. valiha*, new species, Paratype (CASENT9006071) from Massif Andringitra. J. *U. pseudoevanescens*, new species, CASENT9006007 from Forêt Marovato. A, E, H. Epigynum, ventral. B–D, F, G, I, J. Vulva, dorsal. At, atrium of epigynum; BS, base of spermatheca of vulva; CO, copulatory openings of epigynum; EF, epigastric furrow of abdomen; FD, fertilization duct of vulva; HS, head of spermatheca of vulva, including spermathecal poreplate; LL, lateral lobe of epigynum; LP, lateral process of epigynum; ML, median lobe of epigynum. Scale bars = A, B = 0.5 mm, C–J = 0.25 mm.

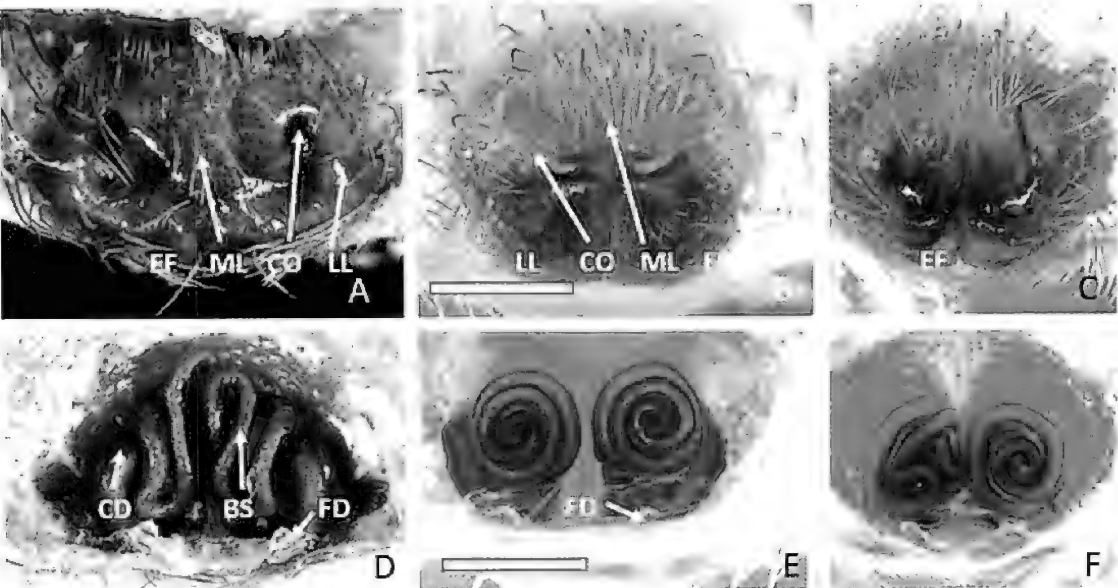


FIGURE 81. *Uduba* spp., ♀ genitalia. A, D. *U. fisheri*, new species, CASENT9026388 from Anjozorobe. B, E. *U. rinha*, new species, CASENT9006108 from R.S. Manongarivo. C, F. *U. ibonia*, new species, CASENT9006033, from Talatakeley, Ranomafana National Park. A–C. Epigynum, ventral. D–F. Vulva, dorsal. BS, base of spermatheca of vulva; CD, copulatory ducts of vulva; CO, copulatory openings of epigynum; EF, epigastric furrow of abdomen; FD, fertilization duct of vulva; LL, lateral lobe of epigynum; ML, median lobe of epigynum. Scale bars = 0.2 mm.

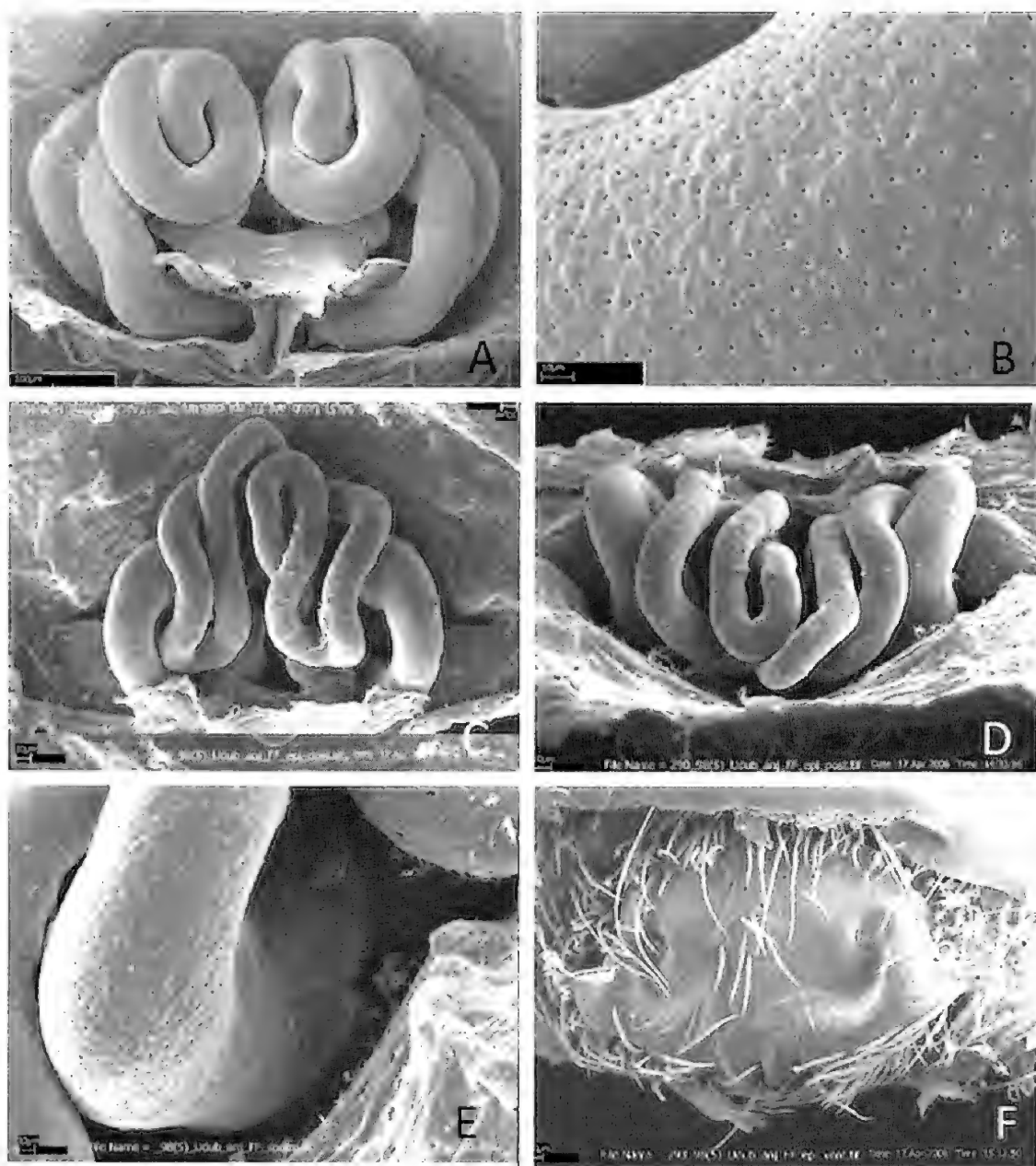


FIGURE 82. *Uduba* spp., ♀ genitalia, SEM images. A, B. *U. platnicki*, new species, CASENT9030253, from Mikira Forest. A. Vulva, dorsal. B. Spermathecal texture, close-up. C–F. *U. fisheri*, new species, CASENT9026389 from Anjozorobe. C. Vulva, dorsal. D. Vulva, anterior. E. Spermathecal texture, close-up. F. Epigynum, ventral. Scale bars: A = 100  $\mu$ m, B, D, E = 10  $\mu$ m, C, F = 30  $\mu$ m.



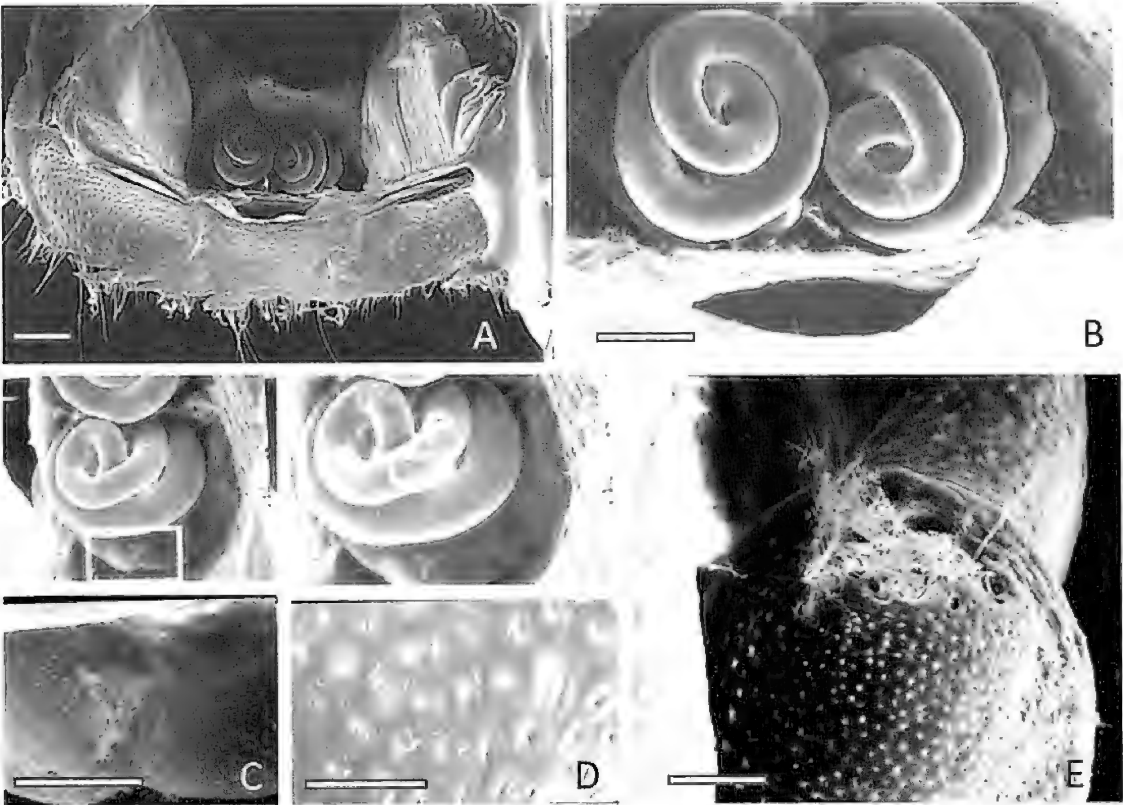


FIGURE 83. *Uduba schlingeri*, new species, CAsENT9006075 from Vatoharanana, Ranomafana National Park, ♀ genitalia, SEM images. A. Vulva and book lungs, dorsal. B. Vulva, dorsal. C. Right side of vulva, dorsal, inset shows HS. D. Right side of vulva, dorsal, inset shows texture of spermatheca. E. Right side of vulva, dorsal, close-up of pores of HS. Scale bars: A = 500  $\mu\text{m}$ , B = 100  $\mu\text{m}$ , C = 430  $\mu\text{m}$ , D, = 300  $\mu\text{m}$ , E = 50  $\mu\text{m}$ .

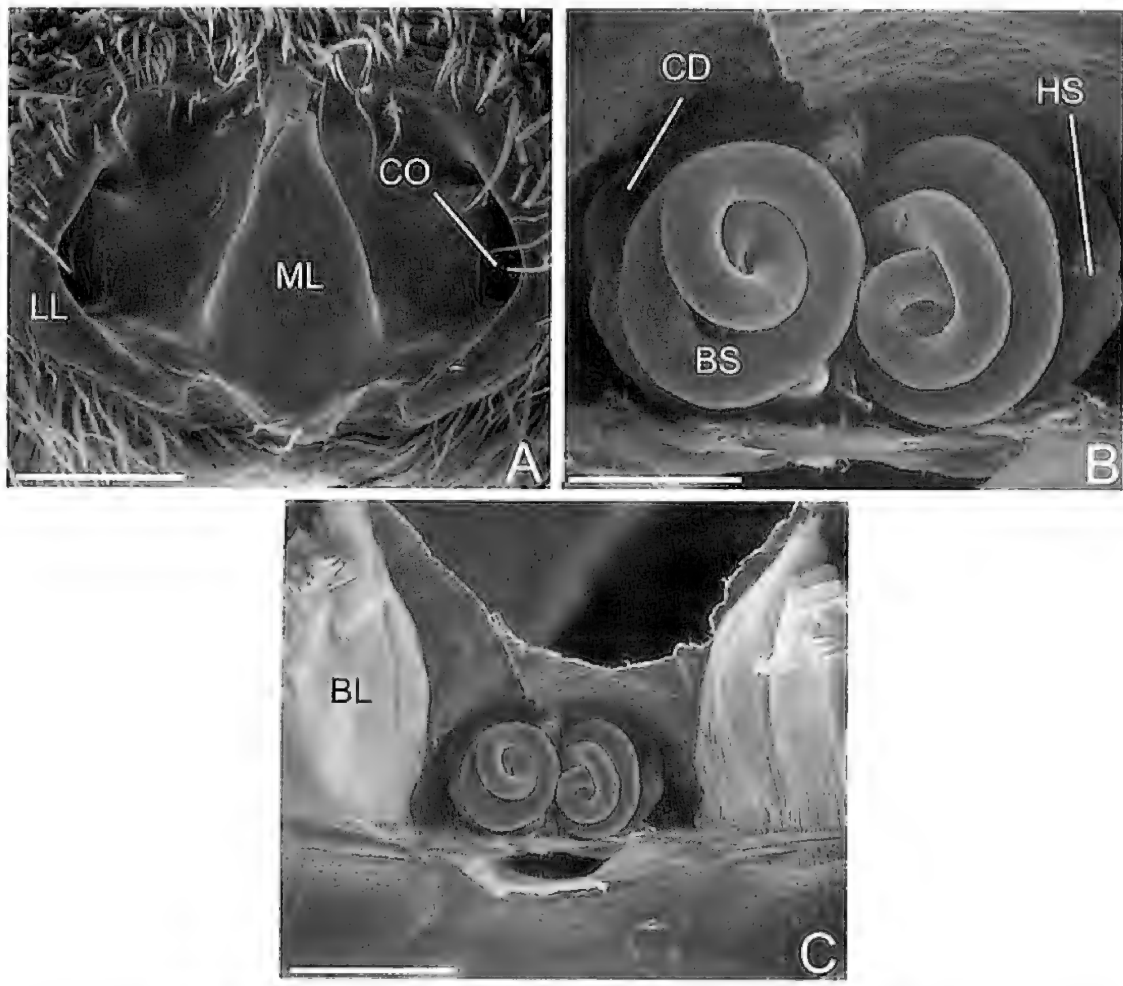


FIGURE 84. *Uduba schlingeri*, new species, CASENT9006075 from Vatoharanana, Ranomafana National Park, ♀ genitalia, SEM images. A. Epigynum, ventral. B. Vulva, dorsal. C. Vulva and book lungs, dorsal. BL, book lungs; BS, spermathecal base; CD, copulatory duct; CO, copulatory opening; HS, spermathecal head. LL, lateral lobes of epigynum; ML, median lobe of epigynum. Scale bars: A, B = 300  $\mu$ m, C = 750  $\mu$ m.



FIGURE 85. All locality records (stars) from this study for *Uduba* in Madagascar.

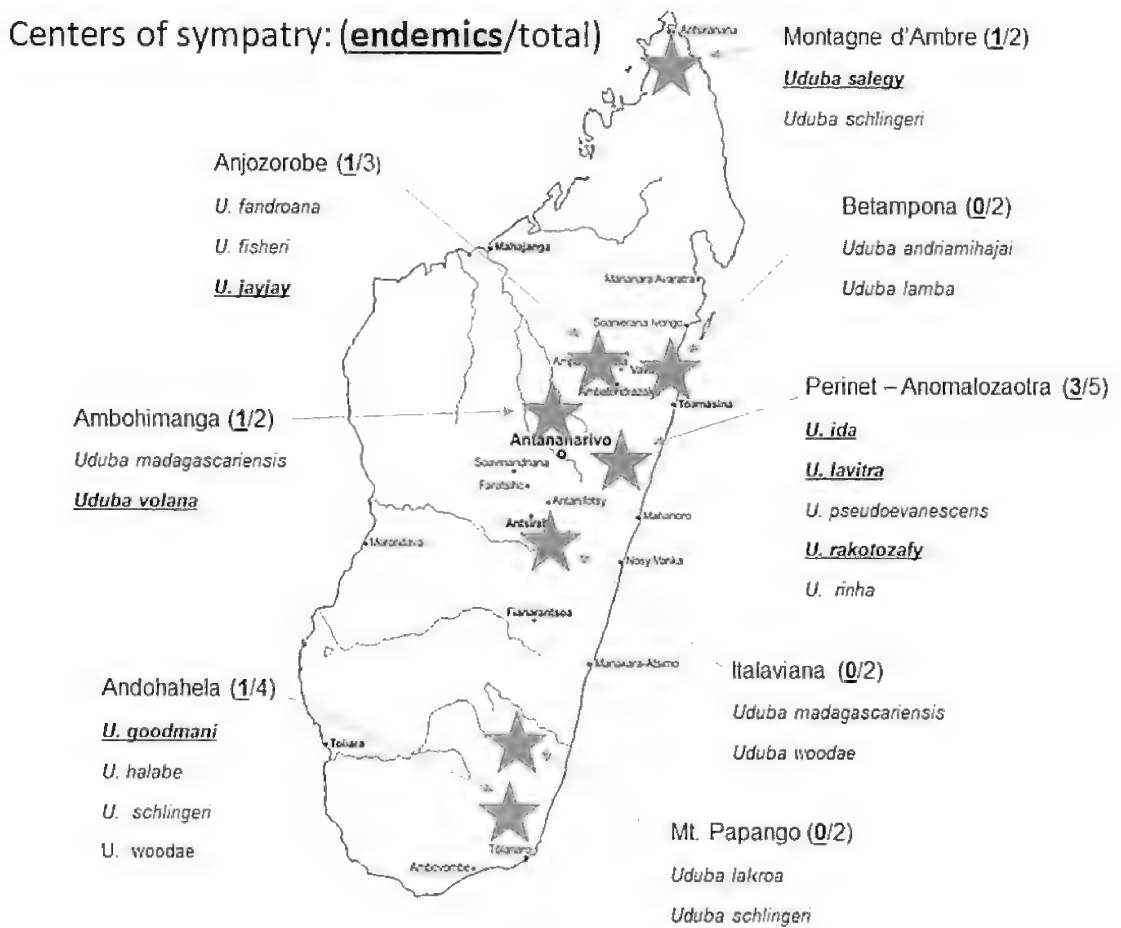


FIGURE 86. Notable communities of sympatry for *Uduba* in Madagascar. Ambohimanga (1/2), Andohahela (1/4), Anjozorobe (1/3), Betampona (0/2), Italaviana (0/2), Montagne d'Ambre (1/2), Mt. Papango (0/2) and Perinet-Anomalozaotra (3/5), (endemic species at site / total species at site).

Centers of sympatry: (endemics/total)

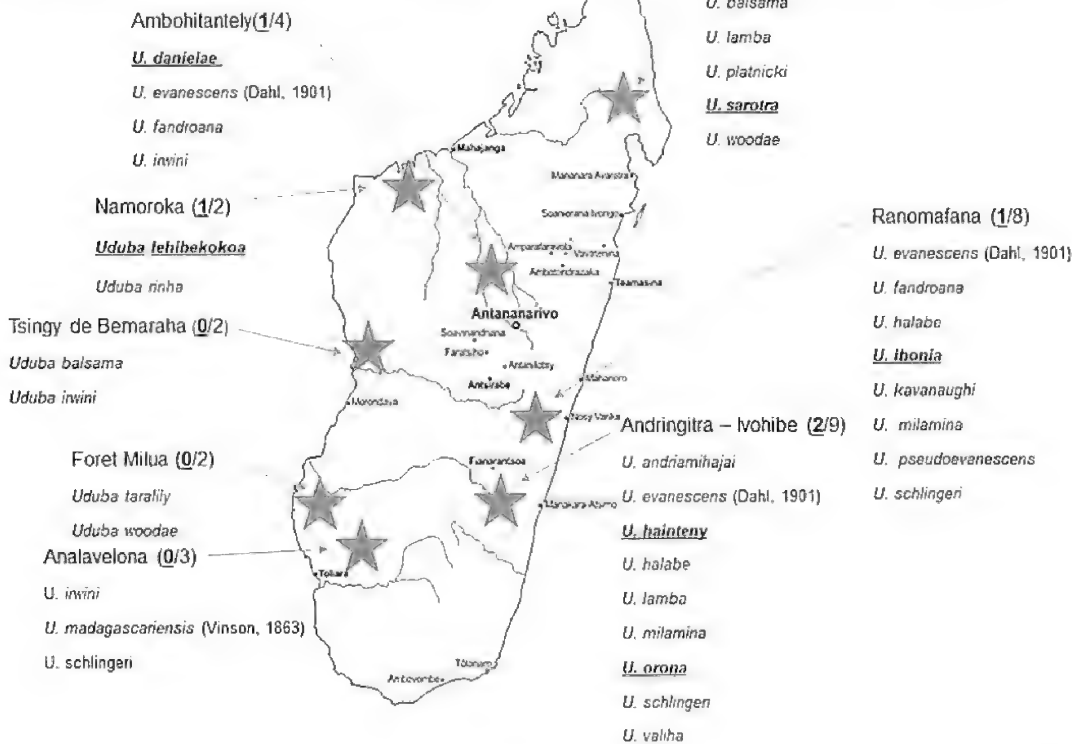


FIGURE 87. Notable communities of sympatry for *Uduba* in Madagascar. Ambohitantely (1/4), Analavelona (0/3), Andringitra–Ivohibe (2/9), Foret Milua (0/2), Marojejy-Anjanaharibe-Sud (1/5), Namoroka (1/2), Ranomafana (1/8), Tsingy de Bemaraha (0/2). (endemic species at site / total species at site).

*Uduba*  
○ *jayjay*  
■ *ibonia*  
□ *hainteny*

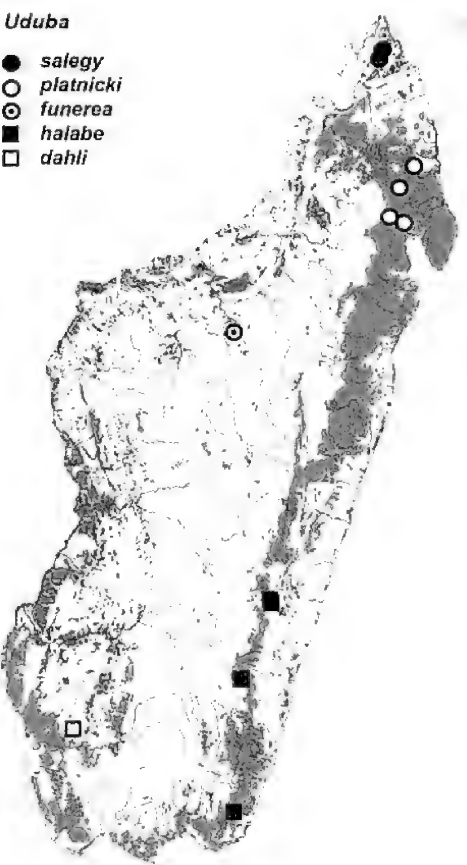
Map 1



MAP 1. Distributions of *Uduba jayjay*, *Uduba ibonia* and *Uduba hainteny*.

*Uduba*  
● *salegy*  
○ *platnicki*  
⊙ *funerea*  
■ *halabe*  
□ *dahli*

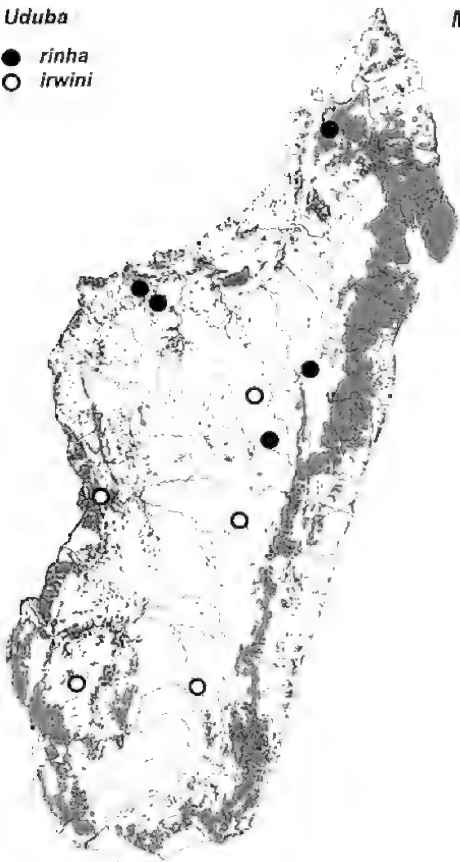
Map 2



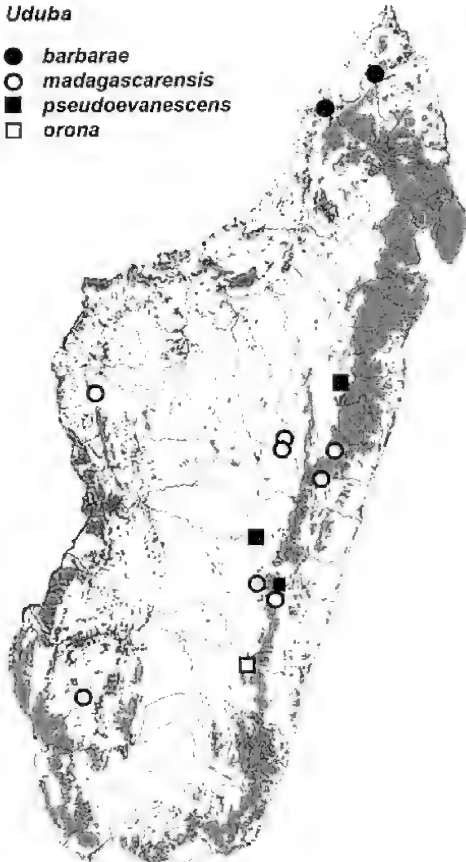
MAP 2. Distributions of *Uduba salegy*, *Uduba platnicki*, *Uduba halabe*, *Uduba funerea* Simon 1906 and *Uduba dahli* (Simon 1903).



*Uduba*  
● *rinha*  
○ *irwini*



Map 3 *Uduba*  
● *barbarae*  
○ *madagascariensis*  
■ *pseudoevanescens*  
□ *orona*



Map 4

MAP 3. Distributions of *Uduba rinha* and *Uduba irwini*.

MAP 4. Distributions of *Uduba madagascariensis*, *Uduba barbarae*, *Uduba pseudoevanescens* and *Uduba orona*.

*Uduba*

- *schlingeri*
- *ida*
- ⊙ *volana*



Map 5 *Uduba*



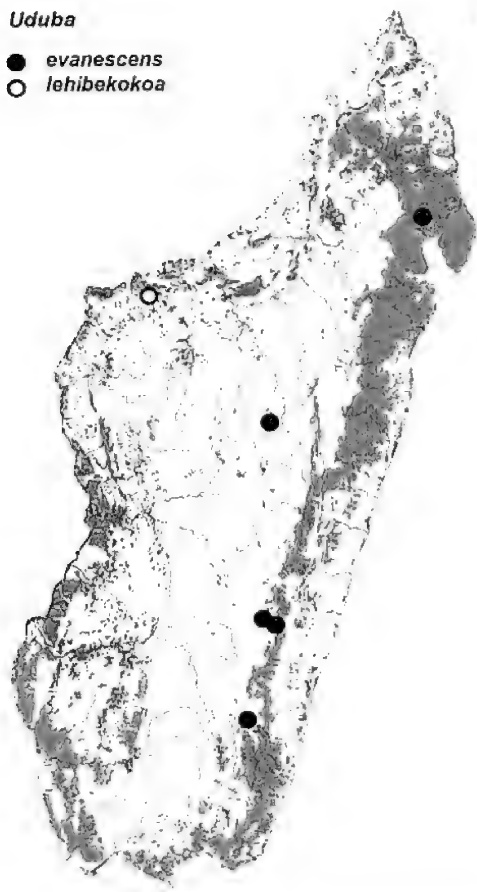
Map 6

MAP 5. Distributions of *Uduba schlingeri*, *Uduba volana* and *Uduba ida*.

MAP 6. Distributions of *Uduba andriamihajai* and *Uduba goodmani*.

*Uduba*

- *evanescens*
- *lehibekokoa*



MAP 7. Distributions of *Uduba evanescens* (Dahl, 1901) and *Uduba lehibekokoa*.

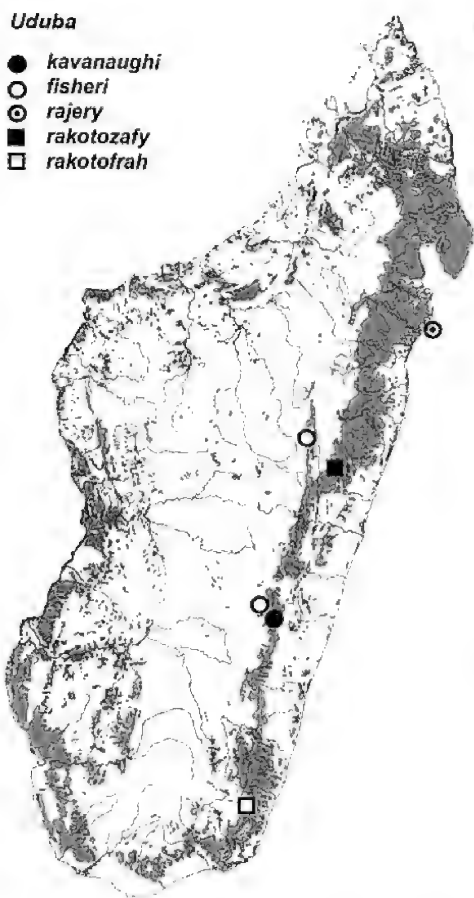
Map 7 *Uduba*

- *woodae*
- *lavitra*
- ⊙ *milamina*

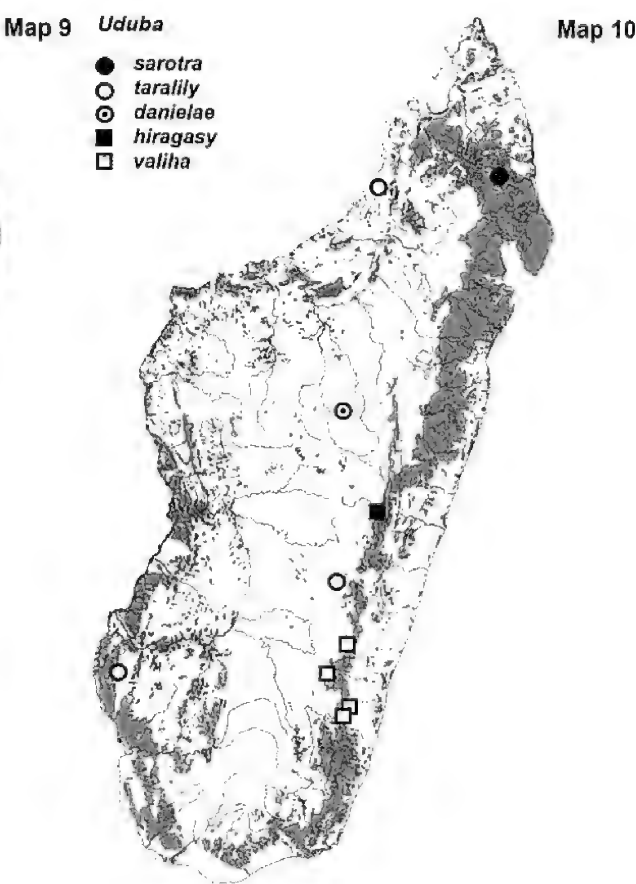


MAP 8. Distributions of *Uduba woodae*, *Uduba lavitra* and *Uduba milamina*.

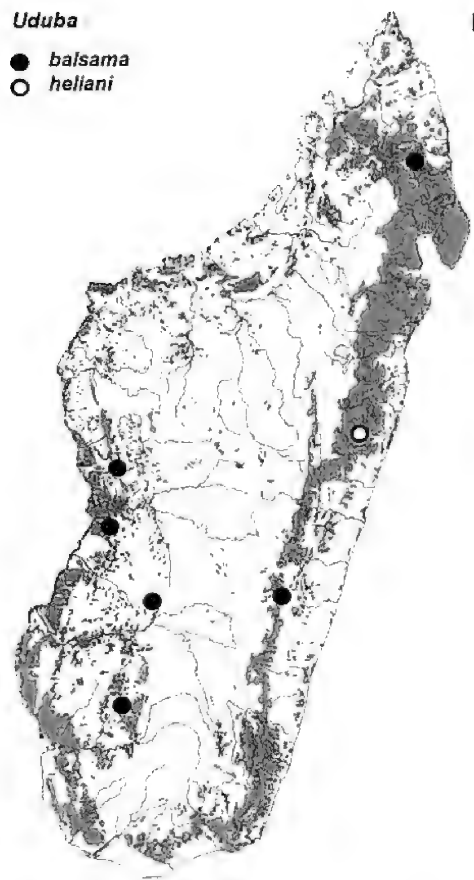
Map 8



MAP 9. Distributions of *Uduba fisheri*, *Uduba rakotofrah*, *Uduba rajery*, *Uduba rakotozafy* and *Uduba kavanaughi*.



MAP 10. Distributions of *Uduba hiragasy*, *Uduba valiha*, *Uduba taralily*, *Uduba danielae* and *Uduba sarotra*.



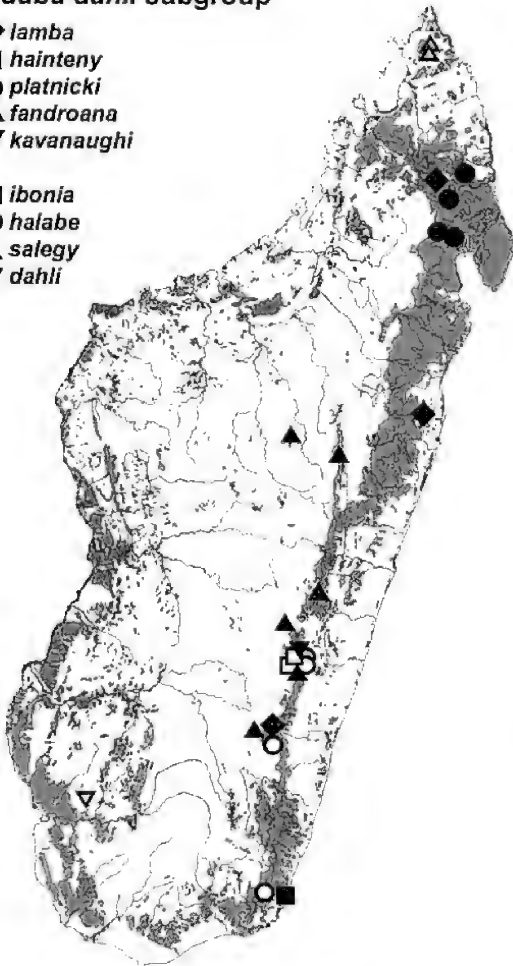
MAP 11. Distributions of *Uduba balsama* and *Uduba heliani*.



MAP 12. Distributions of *Uduba lamba*, *Uduba lakroa* and *Uduba fandroana*.

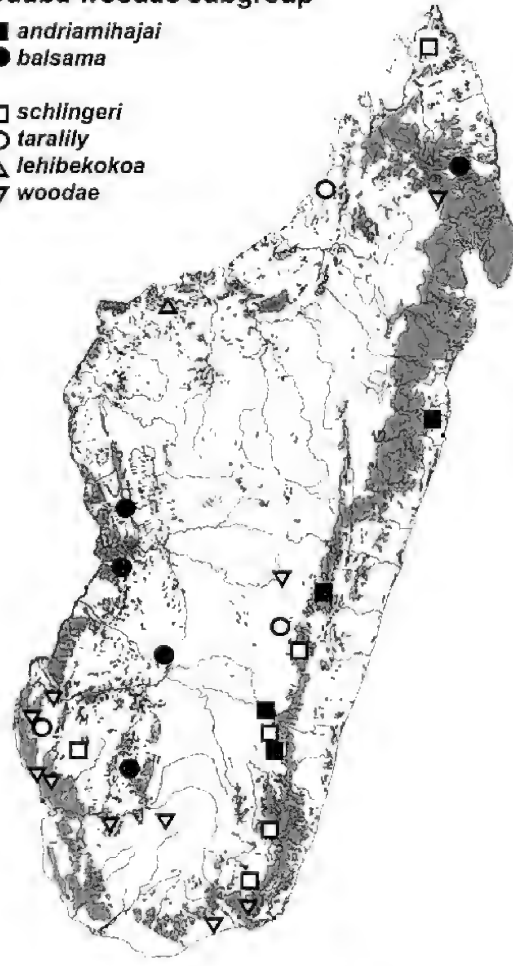
*Uduba dahli* subgroup

- ◆ *lamba*
- *hainteny*
- *platnicki*
- ▲ *fandroana*
- ▼ *kavanaughi*
- *ibonia*
- *halabe*
- △ *salegy*
- ▽ *dahli*



*Uduba woodae* subgroup

- *andriamihajai*
- *balsama*
- *schlingeri*
- *taralily*
- △ *lehibekokoa*
- ▽ *woodae*



MAP 13. Distribution of Group I.a, the *Uduba dahli* group of Group I, the *Epigynal atrium* group: *Uduba lamba*, *U. fandroana*, *U. hainteny*, *U. kavanaughi*, *U. platnicki*, *U. halabe*, *U. salegy*, *U. dahli* Simon 1903 and *U. ibonia*.

MAP 14. Distribution of Group I.b, the *Uduba woodae* group of Group I, the *Epigynal atrium* group: *Uduba andriamihajai*, *U. balsama*, *U. schlingeri*, *U. taralily*, *U. lehibekokoa* and *U. woodae*.



*Uduba funerea* subgroup

- *barbarae*
- *lavitra*
- ▲ *orona*
- ▼ *milamina*
- *funerea*



MAP 15. Distribution of Group I.e, the *Uduba funerea* group of Group I, the *Epigynal atrium* group: *Uduba funerea* Simon, 1906, *U. barbarae*, *U. lavitra*, *U. orona* and *U. milamina*.

*Uduba evanescens* group

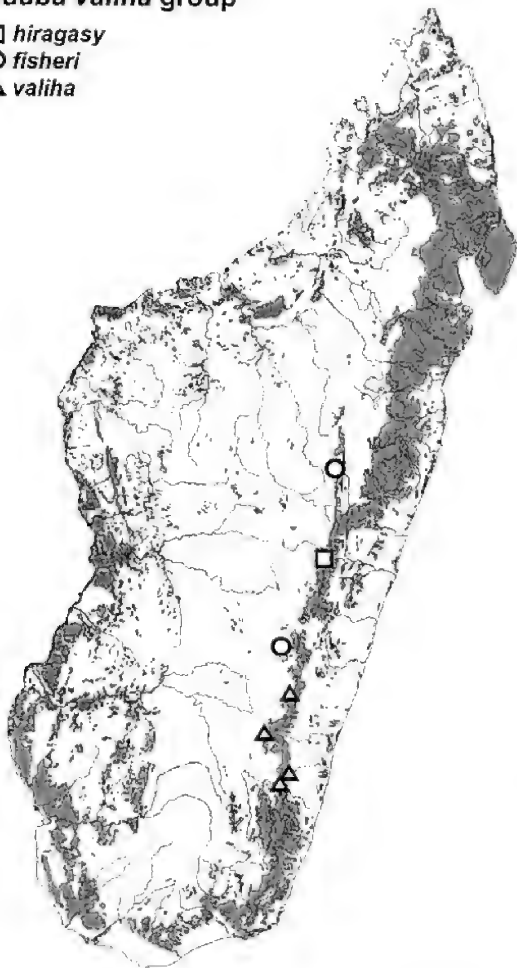
- *evanescens*
- *goodmani*
- ◇ *pseudoevanescens*
- *heliani*
- *rakotofrah*
- ⊙ *volana*



MAP 16. Distribution of Group II, the *Epigynum lateral projection* group, or *Uduba evanescens* group: *Uduba evanescens* (Dahl, 1901), *U. rakotofrah*, *U. volana*, *U. heliani*, *U. goodmani* and *Uduba pseudoevanescens*.

***Uduba valiha* group**

- *hiragasy*
- *fisheri*
- △ *valiha*



MAP 17. Distribution of Group III, the *Uduba valiha* group: *Uduba hiragasy*, *U. fisheri* and *U. valiha*.

***Uduba rinha* group**

- *rinha*
- *irwini*



MAP 18. Distribution of Group IV, the *Uduba rinha* group: *Uduba rinha* and *U. irwini*.

***Uduba rajery* group**

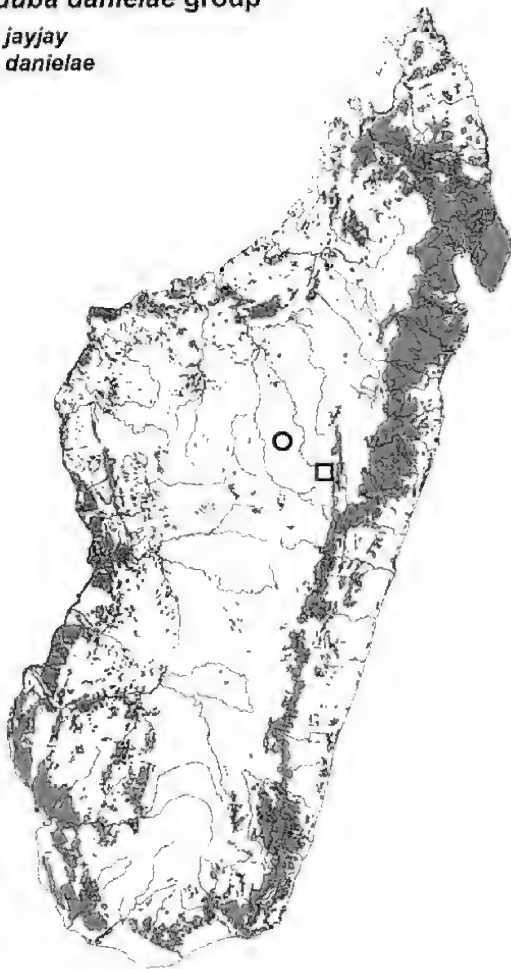
- *rakotozafy*
- *rajery*



MAP 19. Distribution of Group V, the *Uduba rajery* group: *Uduba rakotozafy* and *U. rajery*.

***Uduba danielae* group**

- *jayjay*
- *danielae*



MAP 20. Distribution of Group VI, the *Uduba danielae* group: *Uduba jayjay* and *U. danielae*.



MAP 21. Distribution of *Unclassified species: Uduba sarotra*, *U. ida*, *U. lakroa* and *Uduba madagascariensis* (Vinson, 1863).



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